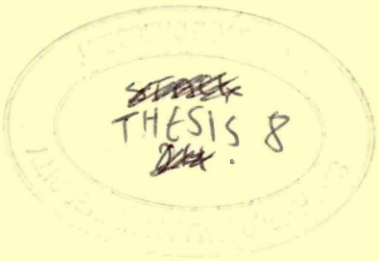

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An Experimental Study of Perceptions of Lectures Attuned to Different Learning Styles.

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Abstract.

An experimental study into the attunement of lectures to students' learning styles, in which analysis was undertaken on 77 students, from the degree disciplines of Physiotherapy, Statistics, Nursing and Psychology. The aim of the study was to discover if students perceived that they had learnt more effectively in lectures attuned to their learning styles, as predicted on the basis of Kolb (1984). The students were presented with four lectures each attuned to a different learning style, at the end of each lecture they were asked to assess their perceptions of the lecture and learning within the lecture via a questionnaire. The results indicated that there were no significant differences in the students' perceived learning within attuned lectures when compared to the non-attuned lectures. This contradicts the connection Kolb claims between approach and learning style.

Close examination of Kolb's learning style theory revealed a number of serious anomalies and internal inconsistencies within his work (Claimed negative correlations between dialectic pairs, mixed learning styles and questionnable support for learning styles from split brain research). These theoretical anomalies were suplemented by experimental results that indicated that learning styles were not stable over time. The implications of this analysis are discussed in detail. Finally speculative further investigations were carried out to in an attempt to provide a more appropriate interpretation of Kolb's work. This further work yielded interesting results that are reported and would merit further study.

CONTENT OF CHAPTERS.

Biography of research.

This study developed out of two bodies of research, one investigating the qualities of the academic lecture and the other studying students' styles of learning. The lecture, despite its regular use as a teaching tool, experiences strong criticism from academic research (e.g. McKeachis, 1963, Bligh, 1972; Gibbs, 1982; Nance and Nance, 1990; Kiewra, 1991.) It appeared from the research that universities were exploiting a seriously flawed teaching tool, addressing this use seemed a beneficial area of further research. Could the use of the lecture become more effective or does it need to be abandoned all together?

The second body of research that formed the foundation to this study was that concerned with learning styles. These styles of behaviour were perceived as opportunity to gain an insight into students' approaches to learning and potentially therefore ways of developing teaching. The range of classifications that come under the banner learning styles is immense, but there are some main types of learning style instruments:

- The multidimensional model attempts to look at the whole of the learning process, often exploiting a combination of direct observation and self rating. (Learning Style Identification Scale, Malcom et al 1981; Learning Style Inventory, Cranfield and Cranfield, 1976; Short Inventory of Approaches to Study, Entwistle, 1981.)

- Affective style instruments look more towards the motivational issues within learning and how this shapes students approaches to learning. (Student Motivation Information Form, Wlodkowski, 1978.)

- Some measures also attempt to gain insight into the perceptual modalities of students arguing this gives a beneficial insight into students' styles of learning.

(Edmonds Learning Style Identification Exercise, Reinert, 1976; Swassing-Barbe Modality Index, Barbe and Swassing, 1979).

- The final major classification of learning style measures works with the cognitive domain and how students approach the processing of information. (Learning Strategies Questionnaire, Kagan and Krathwohl, 1967; Matching Familiar Test Figures, Kagan, 1965; Inventory of Learning Processes, Schmeck et al, 1977; Learning Style Inventory, Kolb, 1984.)

The whole concept of learning styles, no matter what their actual type, is to attribute students specific qualities and abilities. These qualities and abilities differ between students in a thematic way, so while a student may learn in a manner specific to them they will follow one of a number of basic trends. It is at this level the researcher felt that there was an opportunity to bring the two bodies of literature together and undertake beneficial research. The aim was to investigate the possibility of improving students' perceptions of lectures by attuning to their learning styles. The ideas underlying this were that if students did learn in significantly different ways then it would be important to take these differences into consideration when preparing and presenting information to them; this would be true of any presentation of information, not just lectures. Working with this idea it is possible that the flaws so regularly reported about lectures could relate to the fact that lecture presentations often treat students as if they are a homogenous mass. This would make it impossible for the lecture to meet the needs of the majority of students. In turn this would lead to the lecture gaining negative evaluations within research, not because it is inherently flawed in itself but rather because it is poorly utilised.

Once the aim had become crystallised the following objectives were put into place. Kolb's (1984) learning style inventory was used to assign students to specific learning styles and to inform the design of four lectures that would be attuned to each of Kolb's learning styles. Each group of students received four

lectures, only one of which was attuned to their learning style. The experimental hypothesis that was presented stated:

> "Lectures attuned to students learning styles will be perceived more positively than non-attuned lectures".

The results of the study, however, failed to reject the null hypothesis that attuned lectures will be rated no more positively than non attuned lectures. It was at this point the study changed its emphasis from a purely experimental study to an investigative study.

The results gained by the study so far are useful in that they question the validity of Kolb's learning styles and indirectly learning styles in general. However, no insight into why the results were gained is contained within these results. The reasons for the results are really important if something positive for the students' learning experience in lectures is to be gained from the research. So far the study has shown that attuning to learning styles is not of benefit, but given no information about the cause of the results or what would be productive.

This next stage of the research studied why the attuned lectures failed to be rated more positively. The first area that was scrutinised was the implementation and design of the experimental study; was the design flawed and so the foundation of the results? This investigation revealed that there were no major flaws in the experimental design and the lectures were perceived by the participants in line with the experimental design. Thus the results were not simply the product of a poorly designed or implemented study. Hence the spotlight of the research shifted onto Kolb's learning style classifications and the theoretical origins of his work. The aim of this section was to investigated whether Kolb's learning styles were a valid representation of students' approaches to learning. This demanded the implementation of a number of objectives firstly a rigorous examination of Kolb's text "Experiential Learning" (1984), as this presents the foundations of his work. This investigation revealed a number of important anomalies within his work;

these included the connections Kolb claims between his own work and that of Jung; the inappropriate use of Tyler's theory of Possibility Processing; and a string of internal anomalies and inconsistencies within Kolb's explanation of his work. Together these problems cast serious doubt on the validity of Kolb's learning styles, bringing into serious question both the distinctions Kolb makes and the skills attributed to specific groups.

Due to the investigation discrediting Kolb's learning styles the next objective was to re-examine the results in an attempt to provide an explanation for the results that did not rely on his learning styles and could provide information that could possibly inform students' learning experience within lectures. The results of this re-examination produced the concept of Total Learning Style Inventory Score, these reflected students total ability as measured by the LSI. Unlike Kolb's learning styles they were shown to be stable across time. It also indicated students' flexibility in their approach to learning, for although the TLSIS remained stable the constituent elements that formed the TLSIS varied. Students appeared to be more flexible in their approach then learning styles had accommodated. It was speculated that these TLSIS represented students 'general' learning abilities, and it was shown that student with above median TLSIS gained greater degree course marks than below. From these results it is speculated that TLSIS may in some way reflect intelligence and argued that these speculations should form the part of future research in an attempt to verify such speculations.

The conclusions of the research can be broken into two sections that reflect the two major sets of aims and objectives. The experimental work showed that students' with different learning styles do not differentiate their rating of attuned and non-attuned lectures. The investigation of the theoretical foundations of Kolb's work revealed serious anomalies and irregularities that bring into question the validity of learning styles. As a means of gaining insight into the approaches of students to learning Kolb's learning styles were placed in serious doubt.

CHAPTER ONE: THE LECTURE

Literature Review

This literature review (chapters one through to three) comprises the three main sections which mirror the major areas of concern for this study, that is, the lecture, learning styles and the work of D. Kolb. The Literature review attempts to give both an overview to the current state of knowledge and a guide to the path which this study intends to plot within the area.

Status of the lecture in Higher Education

In 1965 Marris reported that, "Of all the three methods [Lectures, seminars and tutorials], lectures are the most universal." Marris clearly places the lecture at the centre of higher education. Historically the lecture took on this position by necessity as the availability of the printed word was limited. Today the lecture still retains a central position, despite a battery of criticism. Behr (1988) was able to similarly comment, "Lecturing is the most common form of teaching in universities and other institutions of higher education throughout the world and is likely to remain so." In 1995 Habeshaw reiterated the dominance of the lecture. There is considerable research which has indicated that lectures as a teaching method are not as effective as they might be. The research draws on a broad range of criteria from information acquisition to the effective use of time. (For example, McKeachie, 1963; Bligh, 1972; Nance and Nance 1990; Kiewra, 1991.) Considering these criticisms there is a logical argument which states that the lecture should be replaced with new teaching strategies, such as structured group work sessions. This point is made clearly by Jackson and Prosser (1989) in the article "Less Lecturing. More Learning". Here they advocate the adoption of the small group teaching method, arguing that it over comes the many of the weaknesses associated with the lecture format. The argument and approach toward the use of small group activities is coherent and strong and their position can be supported by other work in the area (Abercombie, 1960; Moss and McMillan, 1980; Boud and Prosser, 1980). Even with such a strong argument Jackson and Prosser, when considering clearly structured approaches towards

organising and using small group activities, admit that "Such techniques have had many advocates within the literature, but there are few reports of implementation and evaluation" and conclude that "the sad truth is that the lecture remains supreme". Resulting in the situation of new teaching methods are not used while an allegedly flawed lecture system remains in use.

The experiences of Jackson and Prosser (1989), show how good new teaching methods can become redundant even before they come into wide use. This is probably related to the dominance the lecture has within Higher Education. Timetables, rooms and economics are constructed around the lecture. Added to this there is still an aura of lingering academic 'symbolic gravity' surrounding the lecturing. All of which add together to make changing teaching methods difficult. For example, the small group work exercises suggested by Jackson and Prosser would prove difficult if not impossible within a tiered lecture auditorium. This results in a stalemate situation where new teaching methods are rarely widely adopted and lecturers use a lecture format that may well not meet their requirements. The work of Specht (1992) indicates that even modest proposals for the development are not automatically incorporated into the lecture format.

This leads to the notion that it would be more productive to address the flaws that are present within the lecture format than try and introduce a whole new teaching format. This view point is supported by Behr (1988), "It is our task, therefore to explore ways and means of improving the efficiency and effectiveness of the lecture."

The place of lectures within the study.

First appearances would indicate that an insight into lecturing is the focus of this study, this is not the case. This research will be able to offer little information concerning lecturing technique other than the largest of 'brush strokes'. A detailed insight into what and how to lecture will not be generated. Research concerning lecturing technique therefore is not of central importance to this study and therefore does not form a substantial part of this review. Having recognised the distance between this research and lecturing the next statement appears to be somewhat of a contradiction, that is, the lecture is one of the central elements of the study. The reason why these apparently contradictory statements can exist together is that the lecture within this study is taken to represent not only an educational tool with appropriate aids and techniques but also the relationship between the education and the educated. This relationship is what is centrally important to this study. How students respond to an educational environment is based upon a complex relationship between the students, lecturers and the way in which the material is presented. The dynamics of the relationship will hopefully be illuminated by this research and the implications discussed.

Power, Students and Lectures.

Although it has been noted that the relationship between student and educational environment is complex, some themes can be generated. One major theme is that of power, who has it, who controls it and what effect it has? This power relationship will form a core element of this study, power in the lecture specifically and power in the educational relationship in general.

Within traditional images of lectures clear demarcations in power can be seen. It is the lecturer who presents, the lecturer who guides and even the lecturer who is physically placed in a position of power. This leads to a perception of the lecturer having the power. This however, oversimplifies the relationship. The lecturer

does have power within the lecture. If lecturers lost all power it would be questionable whether they could still lecture. It does not mean, however, that lecturers have to have all the power. Power can, perhaps, be divided in such a way as to create a significantly different power balance. This study will look at different balances of power between lecturer and students within a lecture environment in relation to learning styles, the effect these various power relationships have on the students perception of learning and how this information can be used to develop a new understanding about lectures and education. What will not happen is the development of a "ten easy steps guide" to lecturing. Instead an understanding of the different attitudes toward lecturing and education is wanted. Such information does not adhere to a simple step by step guide, but rather elucidate the ontological and epistemological priorities of the educational arena.

In order to evaluate this power relationship the sources of power with a lecture have to be identified. The major source of the lecturer's power is *knowledge*. The lecturers are the ones with the knowledge, the students want to gain access to the knowledge, hence the lecturers are empowered. 'Knowledge' is the primary source of power within the lecture environment. There are other factors such as tradition and expectations of the lecture but these essentially stem from the fact that knowledge and its transmission are perceived to be the basic processes involved in lecturing. If this premise is accepted it is very difficult to argue for a substantially different power balance within lectures. Indeed, it is argued by some that that no change is needed (Vallenta; 1974 and Bergman; 1983). Although for Vallenta and Bergman knowledge sits at the very centre of education Rogers (1983) argues that knowledge should play only a small part in the educational process. He offers a "revolutionary" perspective on what education should be and therefore (indirectly) what should form the lecture should take.

Rogers presented an argument for a whole new perspective on education and this must be briefly explained if the implications for the lecture are to be fully understood. Rogers places the person at the centre of their own ever changing

inner world of experience, a world only fully understood by the individual. Rogers having presented this perception of the person, forwarded the idea that it is pointless trying to judge and understand an individual from one's own perspective. Such an understanding will be flawed and limiting for both the person being judged and those judging. Rogers argues that we must go to the individuals and ask them to reveal themselves rather than evaluate them from outside. This Rogers believed would allow people to be perceived and understood as the true fully functioning people they are, rather than half understood based on an outside judgement. The need for this revealing of self is due, Rogers argues, to the ever changing nature of people:

> "functioning freely in all the fullness of his organismic potentialities; a person (sic) behaviour, a creative person whose specific forming of behaviour are not easily predictable; a person who is ever changing, ever developing, always discovering himself and the newness in himself in each succeeding moment of time" (1983, p295).

How a person is understood will dramatically effect what is perceived as effective teaching. If they are judged from outside, traditional approaches to teaching appear to be meet the requirements. However, if they are perceived as Rogers' fully functioning individuals who cannot effectively be assessed from outside, such an approach no longer appears adequate and could even be inhibiting.

If a fully functioning person is as complex and novel as Rogers presents above, it would appear that any formalised educational system would fail them, for they are constantly changing, self-enhancing, always discovering the "newness within". Such a process stems from within an individual not from outside. At first glance it would appear that if such an understanding of people is adopted an education system would limit rather than facilitate this type of development. Rogers dismisses such a perspective as being locked within a traditional view of education, one where there is an instructor who informs the masses. Such a perception of education has 'the system' and 'the information' at its centre, that is,

what should be learnt and how it should be learnt. Rogers demands if learning is going to be "significant" such a reproductive view of education must be abandoned. Significant learning for Rogers is where what is learnt is meaningful and experiential.

> "When a toddler touches the warm radiator, she learns for herself the meaning of hot: she has learned a future caution in regard to all similar radiators; and she has taken in these learnings in a significant, involved ways that will not soon be forgotten" (1983, p19).

This position is contrasted with the formalised educational system which Rogers presents as being like the learning of "nonsense syllables". Like the rote learning of nonsense syllables Rogers argues that much of formal education is meaningless and ineffective. Rogers clearly believes that *nonsense style* learning is dominant and *meaningful whole person type* learning is regrettably rare.

> "in the vast majority of our schools, education at all levels, we are locked into a traditional and conventional approach which makes significant learning improbably if not impossible" (1983, p20).

Rogers presents a way of breaking the cycle of curriculum and examination led education by placing the emphasis on the student not the system. A method where teaching is replaced by activity based learning, where the relationship is based on teacher student collaboration rather than instruction. The aim of this is that the student takes responsibility for their own learning and teachers act to facilitate this. For Rogers and those who work with his theories what is being advocated is "Student Directed Learning".

Can such a perspective on education be built into a lecture? It appears then that the lecture is the icon of the traditional educational system. Rogers even notes that "Lecturing as the only mode of instruction" (1983, p21) is one of the reasons that the educational system remains locked in a traditional system. The validity of

the lecture within Rogers interpretation of education is looking dubious. It should be noted that Rogers did recognise that there was a continuum between the 'nonsense' style learning and the 'significant' learning. Within these two extremes is there scope for the lecture? Can a lecture be student centred? The answer is one of compromise. An absolute student centredness may well ignore environmental constraints and limiting behaviour of other people which surround the real lecture. A shift towards student centredness is clearly possible and, if Rogers perspective is adopted, desirable. Such a shift would address the issue of power within a lecture, just as student centredness address power within education in general.

From what has been presented about Rogers perspective there is nothing inherent within it which makes it inappropriate for lecturing. There is nothing to stop the contact within the lecture from becoming more evenly distributed and more student centred and directed approach. (It must be noted that student centred does not equate with student control. The aim within Rogers work is to develop a productive and mutually rewarding learning relationship, not a situation where the power was simply handed over to the students). Rogers makes the provocative statement that,

> "Teaching in my estimation is a vastly over rated function", (1983, p119).

This need not impact on the lecture itself. Unless the lecture is rigidly perceived as a time for information transmission alone will it have to be abandoned for a student centred learning environment. This study argues that a lecture can be adapted to adhere to a student centred approach.

Reshaping the relationship.

For a student centred lecture format to develop the lecturer-student relationship must be re-evaluated. A traditional understanding of a lecture[1] is one which

[1] The notion of a 'traditional' lecture is discussed in more depth pg 16.

presents the students as passive recorders of information, with little direct impact on the lecture itself and the material presented. Information is essentially handed from the knowledgeable to the less knowledgeable, with the understanding that the 'pupil' will be able to utilise the knowledge and possibly pass on the information in a similar manner. The knowledge in this interpretation is unchanging and so continually applicable. Rogers attempts to justify his position by questioning the interpretation of knowledge as a universal constant. He argues that the only constant that we are privy to, is that we "live in an environment that is constantly changing" (1983, p120). Hence the value of passing on fixed knowledge is questionable, as the merit and applicability of the knowledge will change from time to time. For Rogers a shift must be made from static knowledge to a focus on the process of learning, as this is "the only thing that makes sense for education in the modern world" (1983, p120). If this process centred approach is to be adopted the traditional format and relationships that exist within the lecture must be changed. Rogers argues that there is a single factor which must be addressed to facilitate these changes,

> "the initiation of such learning rests not upon teaching skills of the leader, not upon scholarly knowledge of the field, not upon the programmed learning used, not upon lectures and presentations, not upon an abundance of books, though each of these might at one time or another be utilised as an important resource. No, the facilitation of significant learning rest upon certain attitudinal qualities that exist in the personal *relationship* between the facilitator and the learner" (1983, p121).

Can the lecture relationship be re-framed to make it a personal relationship between facilitator and learner? There are many things which stand in the way of such a relationship being established. (One major feature is the unwillingness to change but for the purposes of this study it will be presumed that the system is open to change and thus the focus will be on the requirements needed for the changes discussed.) Even Rogers with his progressive approach to teaching does not see the lecture as completely incompatible with an effective learning

relationship. In the above quote he suggests that a lecture "might at one time or another be utilised as an important resource". However, the common interpretation and presentation of lectures is criticised as being part of the "sterile facade" which makes up traditional education. An environment where both student and teacher wear 'masks' and present false self images. For the lecture to change from a facade to an effective tool in education an attitudinal rather than a practical change has to occur. Rogers does not argue that certain presentation techniques or lecture aids should be used. Instead he argues that attitudes towards education and the lecture should change. This in turn may impact on the techniques and aids used, but these are second order changes and it is the attitudinal change which must come first. The attitudes necessary are:

> "First of all is a transparent realness in the facilitator, a willingness to be a person, to be and live the feelings and thoughts of the moment. When this realness includes a praising, a caring, a trust and respect of the learner the climate for learning is enhanced. When it includes a sensitive and accurate emphatic listening, then indeed a freeing climate, stimulative of self-initiated learning and growth, exists. The student is *trusted* to develop" (1983, p133).

There is nothing within these demands of Rogers which fundamentally contradict the lecture format, if it is freed from the constraints that tradition has put on it, that is, lectures as a passive experience for learners and transmission of information for the lecturers.

The work of Rogers has been used to set up the alternative perspective on the traditional lecture and educational methods. The reason for this is that Rogers' notion of "Student centred learning" and ideas surrounding this have become a part of education and our understanding of it. Rogers, however, was not the pioneer in this area. A long historical development of Rogers ideas can be traced. The earliest advocate of what was to become student centredness was

Socrates, who clearly noted the advantages of placing the student at the centre of the learning experience.

> I shall only ask him, and not teach him, and he shall share the inquiry with me: and do you watch and see if you find me telling or explaining anything to him, instead of eliciting his opinions (Socrates c.400 BC).

Here clear origins of Rogers desire to value the learner over the subject-matter can be seen. Dewey (1938) later established the idea of experiential learning, learning through doing by engaging with the learning environment rather than having it explained by the teacher. Finally, work such as that by Weinstein et al (1970) established a humanistic view of education. This is a necessary step if the move from subject to student centred approach is going to be made. The work of those with a humanistic approach to education such as Wienstein was laying the ground for Rogers and his "Freedom to learn"(1983), so aiding the establishment of a well grounded opposition to the traditional pedagogues. For these reasons Rogers' work has been focused here as a convenient way of summing up the major alternative position to traditional education.

Even in the potentially hostile environment of Rogers' student centred approach there are no firm reasons why a lecture cannot play a productive and effective role. The position of Rogers' was used as a type of *acid test* for the lecture - does the lecture have a role to play in non-traditional learning environments? It was felt that if the lecture could exist in what is arguably the antithesis of the traditional approach, the changes proposed within this study would also be possible. The above discussion indicates that changes would be necessary to the lecture, but as a technique it need not be abandoned. It is argued therefore that changes can be made to align the lecture with different approaches to learning and teaching without completely losing its value and worth as a teaching tool. The shaping of lectures therefore appears to be a worthwhile endeavour.

The traditional lecture.

If the phrase traditional lecture is to be used, a definition and understanding of its form has to be generated. Some researchers perceive that lecturing and traditional approaches are so inter-linked that the definition for lecturing presented within their research is simply the "traditional approach" (Godorov, 1981; Kazerani, 1978). Although this highlights the depth of the interconnections between lectures and tradition perspectives on education, more information is needed to draw out the features of a traditional lecture. Spring (1980) presented lectures as teacher-directed conversations, Bubenzer (1976) emphasised the didactic presentation of material and Whitehead (1975) placed weight on the expository, teacher oriented nature of lecture presentations. Incomplete as many of these definitions are they all are unified in their overall position on the relationship between lecturers and students, where the lecture controls the *knowledge*. From these definitions the traditional view of a lecture is one where the student is a passive receiver of information. Bennett (1976) when distinguishing between his 'Progressive' (student centred) position and traditional views on education presented some distinctions which may be of use in clarifying the nature of the traditional lecture. The subject matter in traditional education for Bennett was perceived as being separate from the students, manifested in traditional lectures by the fact that students have no say in the content. When this study uses the phrase traditional to describe lectures it is recognising this general position on lectures, an image of single lecturers controlling the delivery of information to a large student body through the use of "[their] own voice, overhead projector transparencies and associated duplicated notes" (Stanton, 1974, p482). The process is one of direct instruction and control by the lecturer.

Hidden agendas.

Great care has been taken to explain the relationship between Rogers' perception of education and the lecture. In contrast the insight into the traditional lecture was dealt with relatively quickly, sketching the outline of the traditional lecture. This was done because it was Rogers' perspective on education which was novel in its relationship to lectures and so demanded closer explanation. It was not because this perspective was perceived as 'correct'. In contrast the traditional lecture is fairly pervasive throughout education and the understanding of it relatively unified, as shown by the above quotes, extensive elaboration of this position was felt to not be necessary. The pervasive tone throughout Rogers work is one of strong criticism of the 'traditional or standard' educational processes. This is apparent from the quotations used above. However, it is not the aim of this study to adopt or support the work of Rogers. Instead the aim is to bring the two approaches together so that the merits and limitation can be evaluated by the students themselves and an approach towards effective use of the lecture forged on these responses. The approach which is developed will be as a product of these responses and not as the result of prior epistemological, ontological or political allegiances.

The lecture defined

What is a lecture? This question despite the research cited above is far from clear and in many ways has never really been addressed in a wide universally applicable manner. It is however, a very difficult question to answer. There is a wide variety of opinions of what a lecture is, each adding yet another perspective to an already confusing picture. There are very few actual definitions of what a lecture is. Influential texts such as Bligh, "What's the use of Lectures" (1984), Gibb's "Twenty terrible reasons to lecture" (1982) amongst others, fail to identify exactly what they are referring to when they use the term "lecture". Even Habeshaw (1995) who is presenting a more positive image of the lecture than

Gibbs and Bligh takes it as read that his audience knows exactly what a lecture is. Others use broader terms such as, Adeyemi (1992) who defined the aim teaching to be "To bring about change in the behaviour of the learner", and then adds that this should be the basis for lecturing, subtly avoiding presenting a formal definition of the term. The nearest Bligh (1984) comes to a formal definition is "To convey information", and even this is qualified by "If we suppose this is the objective". It is as if no one wishes to risk presenting a definition; this notion is reinforced by Bligh when he is talking about giving advice to new lecturers. "Many new lecturers seek advice. Anyone who has the temerity to offer it lays themselves open to be shot at whenever he (sic) goes into the lecture room, or if he never does so, since it is often assumed that he will be the embodiment of perfection". If this situation is taken to its logical extreme it would mean that the lecture format would never change, because all new lecturers would lecture in the same style as the lecturers who taught them. It is possible that the lecture could take on a more dynamic role if it were freed from the covert traditional ideas about what a lecture should be. This notion lies at the very centre of this study, with the idea that a lecture can be attuned to fit the needs of different learning styles and so promote more effective learning.

To say that there are no definitions of a lecture would be fallacious; it is possible to find various definitions. The problem with these definitions is that they have been to a greater extent ignored, by the lecturers themselves and the researchers. Hale (1964) presented the definition (N.B. Written before the cited work of Bligh and Gibbs, both of whom work without a formal definition of a lecture), "Lecture means a teaching period occupied wholly or mainly with the continuous expositions of the lecturer." Yet this simple definition seems to have been ignored by Bligh (1984) and Gibbs (1982) in their own studies, it was not even critiqued as a poor definition. This adds another dimension to presenting a definition for lecturers, not only must it be a valid definition, it must also be used. For if it is ignored it has no use or value. Criticisms have been levelled at Hale for his definition. Cockburn and Ross (1980), described the definition as "reductive and retrospective", while admitting that "most lectures probably fit this

classification". This may be the reason why it was not adopted by the area. Perhaps the lecturers did not find it helped them in their work but limited the possibilities.

This study's definition of lectures.

A working definition of a lecture must be presented by this study and it is now that empathy is felt for earlier researchers who had such difficulty in providing a definition. The presented definition is aimed to work effectively between the two extremes of a definition continuum, the rigid definition and the free floating liberal definition.

- Firstly, a lecture requires student lecturer participation[2]and it must in some way aid the learning process. This could occur by providing information, motivating students to discover information for themselves or bringing students together to reflect on their work.

- Secondly, a lecture can exploit any method to facilitate the learning and thus it need not be constructed along the traditional format.

In short a lecture is an allotted period of time which aids the learning process and where a single lecturer is able to advance and/or facilitate learning for a larger student body. This definition opens up the possibilities for the lecture and hopefully allows it to develop from its traditional origins. Clearly it does not state that a lecture is the product of specific elements, for such a definition would be counter productive, as it would limit rather than expand the possibilities of the lecture. It does however, indicate that a lecture can be shaped and changed

[2] The participation refered to here represents the direct commuication necessary within any lecture environment, however it is also designed to encapsulate the possibility that some lectures may choose to directly and personally interact with students, e.g. via small group activities. Hence the the participation could be one way and at a distance e.g. open university televison lectures or part of an interactive lecture with student engaging directly with lecturers.

depending on resources, student group, aims and objectives of the course. To many this definition may appear to be weak and of little value, for it does not give a precise and detailed interpretation of what a lecture is. Despite the desire for a definition it may well be as detrimental as the no definition situation in which we find ourselves at the moment.

Already the exceptions to the definition spring to mind, can a lecture not have two lecturers rather than just one? How does a lecture differ from a seminar? Such exceptions seem always to raise their heads. However, the definition provided gives a clear indication of what this study takes to be a lecture, while not limiting it to a single concept. As for the exceptions, although they should not be blatantly ignored, they tend to be the bi-product of any definitions and their presence should not prevent a definition being forwarded.

CHAPTER TWO: FOUNDATIONS OF KOLB'S WORK.

What are learning styles?

The phrase 'learning style' is used frequently within much of contemporary educational research, but this does not imply that it is a new concept. Escalona and Heider (1959) identified the essence of what is taken to be learning styles today.

> "As one notes behavioural alterations from infancy to - in the case of our study - later pre-school ages, one knows that not a single behaviour has remained the same, yet one is struck with the inherent continuity of behaviour style and of the child's pattern of adaptation."

There are many different accounts of learning styles, each set representing the author's approach or bias. There does, however, appear to be a unifying feature that is constant despite the wide range of names that are given to learning styles. A definition which covers this unifying feature was presented by Cornett (1983). She defined learning style as "a consistent pattern of behaviour but with a certain range of individual variability." This definition links all the learning styles with the unifying notion that in some way they represent a "consistent" approach to the learning environment. What a learning style is not, is a guarantee of an individual's exact behaviour for, as Cornett argued, "When persons learn they use styles that are uniquely their own." These 'unique styles' are shaped by the task involved and the teaching method used. Thus trends appear in the approach of students. It must be noted that not all researchers embrace the concept of learning styles. Entwistle and Ramsden (1983) prefer to describe approach to study as 'Learning Orientation'. They believe approach to study results from a combination of motives, styles and perception of the situation. They thus adopt the more flexible term 'Orientation'. Although Entwistle and Ramsden do not align themselves directly with learning styles, they still adopt the notion that approach to learning varies thematically and can be classified.

To summarise, a learning style is a consistent overall pattern of behaviour which represents the general direction and approach a learner will take. It must be noted, however, that an element of unique interpretation and action is involved within any given learning style.

Learning styles appear to be constructed from a number of constituents. Cornett analyses learning styles as having three main aspects: the cognitive, the affective and the physiological. By far the most readily accepted and researched area within learning styles is the cognitive. Various researchers have presented their own perspective; Witkin et al (1977), for example, created the dimension 'Field-Dependent' and 'Independent' or 'global', and 'articulated'.

This study will take a holistic approach towards learning style, rather than try and focus on any one of the constituent elements (e.g. cognitive). It will note the overall learning style (Kolb's) and how this is affected. The reason for this is that this study is concerned about what perceived effect various learning environments have on learning styles. It does not propose to investigate why the students react differently. It is at this level that the three elements of learning style would be beneficial within the research, by aiding the identification of the origin of the variation.

Orientations and Approaches to study.

Learning styles, and Kolb's learning styles in particular, represent a 'cognitive' emphasis within our understanding of learning. They look at differences in learning as being representations of different cognitive abilities or preferences within the cognitive domain. Learning styles tend therefore to be primary, reactions to the environment are secondary to these representations of cognitive preferences. Not all learning research adopts this strongly psychological approach. Attempts have been made to establish a more holistic approach that freely recognises the influences of context, assessment, motivation and teaching; within

the complex equation that is learning. Such research is often labelled as 'approaches to study' and 'learning orientation' (Entwistle, 1984). Both these phrases attempt to encapsulate a wider range of influences than the cognitive learning styles.

Marton (1975) noted that learners can adopt distinct approaches to learning which he labelled as 'deep' and 'surface' learning. These labels refer to different strategies that underpinned their actions when learning. The end results of deep and surface learning were also shown to be qualitatively different. Deep learning represents a full understanding of material, whilst surface represents an ability to reproduce the material but with a limited understanding. Entwistle and Ramsden (1981 and 1983) carried out considerable research into deep and surface learning and the factors that affected the adoption of either approach. The deep approach was defined as an *intention to seek understanding*, whereas the surface approach was defined as an *intention to reproduce* what the student perceives is required. A deep approach was shown to be partly dependant on the learner having prior knowledge of the topic; this proved particularly true for science subjects. Intellectual ability was also shown to influence the adoption of a deep approach; students with greater intellectual abilities more readily embracing deep learning. Hence the approach is the result of both personal qualities (intellectual abilities) and experience (prior knowledge). These results were reinforced by the fact that intention to use a deep approach need not signify that it would be effectively or completely implemented. Deep learning is clearly the product of both intention and action. This led Entwistle (1981) to argue that deep learning was to be found at the intersection of comprehension learning and operation learning.

The Lancaster research introduced a third possible approach to learning, that of the *strategic learner*. This approach is defined as the intention to seek to maximise grades. This is done by effective time management, study, effort and effective the manipulation of the assessment system. Examples of such manipulation is the use of past papers to predict exam questions, gaining information about marking schemes and generally gaining as insight into the

examination system. This type of learner is hoping that such strategic gambling will pay off so as to maximise grades. This learning may be viewed as cynical but if the assessment system demands regular performance on exams it may be highly effective.

Entwistle (1987) in a review of this work noted that;

> "Another main finding from this research was that approaches to studying could be viewed as relatively consistent individual differences".

For any labelling theory demonstration of stability is paramount if the theory is to be seen as representing an individual's personal characteristics. This is not to say that learning orientations ignore the effect of context on learning, but rather that if the study of the individual is to be fruitful then some degree of stability is required. If no stability was demonstrated then studies should focus on the context of learning alone as the learner will simply be a reacting to this. Learning orientation are best perceived therefore as stable characteristics that are open to contextual influences.

No learning can occur outside of a context and it is argued that this context can shape the approach of students to learning. Svensson (1977) argued that an approach was a reaction to a particular context, but it should be noted that although this was the expounded position the research also indicated consistency in approach. Generally approaches to study recognise that context will shape learning, but this influence will be on a relatively stable approach. Ramsden (1981) noted that 'good teaching' within a department was associated with students who showed higher scores on deep learning and a greater degree of intrinsic motivation. Clearly the argument here is that 'good teaching' is influencing the students approaches towards deep learning. This position was supported by Hodgson (1984) who noted that lecturers could provide students with vicarious experience of the subject. These experiences had the effect of influencing the students to adopt more extrinsic motivation, which in turn is

associated with deep learning. Here the teacher is influencing the approach adopted by the students. The same basic effects have been noted at a departmental level also; changes here can effect students' approaches. Newble and Jaeger (1983) showed that students were directly influenced by the assessment of the course and shifted their activities in line with any changes. When the clinical examinations were reintroduced into the curriculum the students spent more of their time in a ward setting gaining relevant experience.

Learning orientations attempt to accommodate the vast array of influences that impact on learning within their basic theories. The student although central within the learning process is viewed as only one element within the learning equation. To understand learning therefore the educationalist must also address the influences of teaching, assessment, departmental influences, as well as the qualities of the learners. Learning styles like Kolb's however, are more clearly focused on a single aspect of the learning equation, that of cognition. The advantage of this is that the examination of the cognitive effect is open to ready and thorough investigation. Although learning orientation may appear to be more comprehensive, the examination of such complex interactions may prove exceptionally difficult at best.

> "Although the examination of the total set of interactions suggested by the [heuristic] model is currently formidable, even an impossible, task, it might be possible to investigate the interactions of a sub- set of the components." (Entwistle, 1987, pg 25.)

In light of this cognitive learning styles may be seen as one such sub-set and although not providing a full picture of learning does give a useful insight into some of the basic processes.

Stability of Learning Style

If learning style is going to be used as a tool by tutors it is important that the learning style of the student is relatively stable. Yet there are classic studies within psychology (Piaget, 1932, Kohlberg, 1969 and Perry, 1970) that indicate that a person's approach to their environment dramatically changes during their lives. This would seem to indicate that learning styles may (if a large part of them is cognitive) also change during development. The next question that must be asked is, if learning styles do change, to what extent do they change? Kirby (1983) addressed this issue suggesting that: "process changes within the cognitive structure do occur, but even with these changes, there would be more variation among an individual's learning styles (interstyle differences) than could be found at different points in a person's life (intrastyle differences)". Thus it would appear that learning styles do change during a lifetime. However these changes are relatively confined with learning style fluctuation no more than during their day to day existence.

The fact that learning styles do change raises the issue of whether it is possible to usefully identify a person's learning style and use the knowledge to aid their education. It appears then that a person is able to alter the style (or "style flex" as Cornett named it) to better fit a learning environment without overt instruction. If this is the case care must be taken in assigning learning styles, for any style may be sufficiently flexible to appear different in another learning situation. This leads to the logical conclusion identified by Schmeck (1988); "In a sense the most sophisticated, most developed style is no style at all but a versatile reduction of cross-situational, style like consistency". This last statement is not meant to undermine the whole concept of learning styles; rather it recognises the flexibility of a style. It is not to be perceived as a concrete characteristic, fixed like eye colour, but rather a guideline to overall learning characteristics.

Types, Traits, States and Styles.

The fact that a behaviour, perception or feeling is state or trait dependent influences how it is interpreted. Thus the issue whether a learning style is a state or trait impacts strongly on how it operates and is interpreted. Pervin (1989), distinguished between the two as follows:

> "Trait. A dispositions to behave in a particular way as expressed in a person's behaviour over a range of situations."
> "State. Emotional and mood changes (e.g., anxiety, depression, fatigue) that Cattell suggested may influence the behaviour at a given time. The assessment of traits and states is suggested to predict behaviour" (1989, pp. 10 - 11).

Kolb uses the learning styles he developed to give an insight into the way in which a person approaches a learning task. This approach to learning is presented as relatively enduring; This is due to stability created by 'consistent patterns of transaction.' As a consequence of this relatively enduring quality of learning styles, Kolb is able to identify and distinguish between the dominant abilities of particular learning styles. Convergence, for example, is associated with thinking and judgement (1984, p. 81, figure 4.3.) The clear implication here is that different learning styles exploit different abilities within the learning environment and comprehend the learning environment differently. At no point does Kolb argue that the abilities of a given learning style are mutually exclusive, that a converger does not possess the skills of a diverger. Rather Kolb argues that convergers will more readily exploit their dominant skills which are associated with a style. This allows Kolb to encapsulate the vast array of approaches to learning within his theory:

> "the physiological structures that govern learning allow the emergence of unique individual adaptive processes that tend to emphasise some adaptive processes over others" (1984, p. 62).

Kolb takes the application of his theory of learning styles further than just describing individuals. He uses learning styles to distinguish between degree course, professions and even specific tasks within a profession. A rational argument for the connection between learning styles and degree course is presented by Kolb. A degree course represents:

> "a specialisation in particular realms of knowledge; thus, we would expect to see relations between people's learning styles and the early training they received in an educational speciality or discipline" (1984, pg. 85).

The same basic argument is suggested for the connection between learning style and profession. The value of such connections, in the light of experiential learning theory, is patent - the environment can be moulded to enhance the learning experience of the individual. (This was the original premise for this research project, the attunement of lecture to learning styles, with the aim of increasing students' positive perception of those lectures.)

In light of this information it appears to be clear that Kolb is presenting learning styles as relatively stable phenomenon. If learning styles do exhibit such stability then they would best be described as a trait. It is argued here that if the connections between learning style and degree course or profession are to be reliable across time then learning style has to be presented as some form of trait. If this were not the case any predictive validity needed to reliably connect learning style and degree or profession would be lost.

Despite how Kolb presents his work, and the need for there to be the stability of a trait to gain long term predictive validity, Kolb argues that his learning styles are not traits. He goes on to highlight the limitations associated with the use of traits.

> "Psychological categorisations of people such as those depicted by psychological 'types' can too easily become stereotypical that tend to

trivialise human complexity and thus end up denying human individuality rather than categorising it" (1984, pg. 63).

Added to this criticism is the notion that traits are associated with static or fixed perceptions or abilities. Such a fixed position would bring into question the whole notion of experiential learning which requires flexibility and development. Also inherent within traits is a possible 'fatalistic notion', that is, abilities are set and no amount of education is going to change that. Based on such a rigid interpretation of traits, prescriptive arguments of people's value and abilities can be easily proposed. Quite reasonably, Kolb shies away from this rigid interpretation of learning styles as traits, which challenges the notion of experiential learning. It is not this point with which issue is taken, but rather how Kolb justifies his learning styles as not being trait dependant and his attempt to present them as states. Kolb adopts a contextualist perspective and from this perspective states, "Psychological types or styles are not fixed traits but states". Clearly Kolb is distancing himself overtly from the notion of traits. What will be argued here is that despite such clear statements Kolb only distances himself from traits in description and not in action. In practice Kolb's learning styles are still effectively traits and have to be so if the are to work effectively in connection with degree course design and occupational selection.

Idealism is presented by Kolb as the root metaphor in terms of which traits are commonly interpreted. The consequence of this is that traits or types are perceived as the ultimate form of reality, against which everybody is an imperfect representation of the universal form. Such an interpretation of traits results in the situation where a researcher has to attempt to study something that does not empirically exist. Such an interpretation is fraught with difficulties, hence Kolb turns to a different epistemology to address these problems. Contextualism is presented as able to accommodate human individuality and so negate the 'failed ideal' problems of idealism. Rather than developing standards against which everyone is an imperfect representation, the foundations of a contextualist perspective present people as a product of their emerging histories. This is the

process by which a person and events are shaped. Hence the person is not a 'slave' to a prescribed trait but rather is able to shape their own state.

What Kolb argues appears initially to be reasonable, as it allows for personal development through experiential learning. However, the benefits of such a perspective do not come without problems and the flexibility needed for experiential development could possibly undermine any potential use of learning styles. In order to discuss this further it is necessary to unpack exactly what the foundations of Kolb's learning styles are. Learning styles give an insight into the learning process. A learning style represents a single phase in the learning cycle and in order to learn effectively Kolb argues that a learner must move through all four parts of the learning cycle. However, Kolb presents the idea that a person's ability may not be divided equally between the four learning phases. They may establish a higher ability in one area. This is the person's learning style and is the manner in which they most readily engage with the learning environment. The reason why such preferences are established is due to the development of "consistent patterns of transaction between the individual and his or her environment" (1984, pg. 63). What Kolb is therefore arguing is that within state learning styles there is a level of stability. Flexibility, however, is one of the central tenets of states. Adding any great degree of stability to them fundamentally contradicts their character. Kolb goes on to undermine further the open flexibility of states. He draws on the work of Tyler (1978) and presents the establishment of learning styles as the result of 'possibility-processing'. Kolb explains that:

> "The way we process the possibilities of each new emerging event determines the range of choices and decisions we see" (1984, pg. 64).

Effectively this is a positive feedback loop in as much as the actions and consequences of an event act so as to shape future actions and their subsequent consequences. It appears that Kolb is arguing that learning styles develop as a result of a form of 'conditioning'. The consequences of actions are reinforcing the

individual to engage with or avoid a particular approach to learning. Both the notions of positive feedback and conditioning result in a stable state, not fixed but relatively stable. This state is open to change, but change will be the product of a drawn out process and needs to be sufficiently salient to 're-frame' prior learning experiences. The consequence of all this is the production of a relatively stable phenomenon, which is as likely to resist change as much as to engage with it. Such stability is not an issue for learning styles. As argued above, it is believed here that it is a necessary part of Kolb's interpretation of learning styles. What, however, is an issue is the notion of referring to these learning styles as 'states'. The commonly accepted understanding of state it is of a readily changeable feature. In the definition of state presented above, the concept of mood is referred to, something that is transient. This is combined with the point that states effect behaviour "at a given time" (Pervin, 1989). Again this emphasises the flexibility of states, as they refer to a given time rather than across time. If there is to be any value in Kolb's association of learning style with profession or degree course, a learning style must reflect stability across time. If learning styles truly were flexible, then knowledge that a particular professional group engaged with learning tasks in a particular way would be of no value. This is because the next time they were assessed they could have dramatically shifted to another perspective.

It appears that Kolb recognises the problems associated with referring to a phenomenon as a trait. The main problem with traits is that they deny individual flexibility and can act to reinforce those differences along stereotypical paths. The picture of 'state' learning styles that Kolb presents, however, is equally open to reinforcing the differences that the learning style inventory identifies. This is done by 'possibility processing' (Tyler, 1978), which Kolb cites as one of the foundations of learning styles.

Kolb present 'genetic heredity' as the original factor in the development of learning styles. This genetic inheritance acts to shape how the learner engages with the learning environment. It also presents, in association with learning

history and immediate environment, two other factors which influence how a learner will engage with the learning environment. However, if Kolb places an emphasis on Tyler's (1978) possibility processing then genetic inheritance is very important as this is at the root of all 'self-programming' as it affects learners' choices before they even have established a significant learning history. The other important issue about genetic inheritance is that it is absolutely stable. This pushes Kolb's learning styles towards trait like stability and away from trait like flexibility.

It may appear that the argument being presented is one simply based upon time scale. How long does a behaviour have to be engaged in for it to be called a trait? As such this is a relatively minor issue. For whether a phenomenon is a trait or a state does not alter the action or nature of the phenomena itself. The fact that a converger learning style is described as a trait or a state does not change the qualities of a converger learning style when an individual is exploiting this learning style. What does change is how it is globally interpreted. This radically changes and is the reason why the distinction between trait and state is so important. This distinction is not addressed by Kolb and thus causes confusion within his work.

The applications Kolb puts his learning styles to (associating with degree course and professions) require a high level of stability and generally exhibit more trait characteristics than state like characteristics. Hence there is an anomaly within his work. This anomaly is not overtly addressed by Kolb, but the existence of the anomaly need not mean Kolb's work should be totally rejected. Rather his work needs to be interpreted in light of the anomaly. If learning styles really are states as Kolb suggests, then the flexibility should be emphasised when applying the learning styles to other variables or characteristics. Hence using learning style to associate students to degree courses may engage in the very same 'self-fulfilling prophecy' which Kolb criticised traits as doing. This is because it denies individuals the flexibility which Kolb presents as central to his learning style theory.

If learning styles truly are flexible then the best use of learning styles and learning style theory is to aid an individual's understanding of their own approach to learning and how this varies and changes across time and tasks. This is not to say such state dependant learning styles are unreliable per se. They may exhibit internal reliability, split-half reliability for example. They would not, however, show test - re-test reliability needed to reliably predict across time. If, however, the 'state' argument presented by Kolb is taken as misinformed then the trait related characteristics of learning styles should be emphasised. If the learning styles are taken to represent a stability in approach which transcends state and shifts to trait then the prediction of behaviour across time can become more reliable as 'test re-test' measure will be appropriate. Hence the association of learning styles with degree courses and professions would allow teachers to shape materials to the learning styles.

Before concluding, assigning learning styles to either a state or trait category is very problematic, as both categories bring with them specific qualities.. However, the course that is mapped by Kolb between these two perspectives of learning style, undermines both and leaves the theory contradicting itself. How learning styles are used can have the effect of assigning a learning style to one or other category. It seems clear, on close reading, that Kolb's work with professions and degree courses, essentially implied a trait basis for learning styles. If not, the connections made between learning styles and these features would be unreliable, if not, invalid.

Making the match with learning styles.

There are implications for the adoption of the concept of student learning style. Essentially learning styles are ways of accounting for students' individual differences. If there is to be any value gained from such recognition, teaching and learning strategies will have to accommodate these individual differences. The individual differences reflect the variations in student's perceptions of the learning environment.

> "A person's reaction to a stimulus is, to a large extent, a function of how he (sic) perceives, analyses, and understands the situation or, in other words, a function of their cognitive style" (Onyejiaku, 1982, p31).

Onyejiaku is clearly arguing that people's reaction to a stimulus is characterised by their cognitive style. If insight can be gained into these reactions, perceptions and functioning, teaching strategies can be adopted which will facilitate and enhance a particular style of learning or cognitive approach. The aim therefore is to 'match' learning style with teaching style, with the belief that this should promote more effective learning. Matching need not simply occur within the lecture room but can also occur at a more general environmental level. Astin (1984), Pascarella (1986) and Tinto (1975) argued that matching student to environment was not simply a fine tuning device; it was the difference between 'withdrawal from university and continuing'. Clarke extended this argument to the universities themselves.

> "For an institution, the question of congruence between students and environment may mean the difference between improved organisational health and gradual decline. (1987, p115)

Clark has presented a very broad perspective on the idea of matching student to learning environment. Within his study he takes into consideration social activities and place of residence. All of these are outside the realms of this study.

However, his research does emphasise the importance of match or congruence within a learning environment. This is as true for a lecture as it is for social support networks within an educational establishment.

Many studies have been carried out on the effects of cognitive style and academic performance. Do some styles of cognitive approach facilitate a better performance at particular tasks? One area where the research is particularly rich is in mathematics education, and it is possible this is because pure mathematics demands very specific abilities from the learners. Balik, (1976); Bieri, Bradburn and Galinsky, (1958); Branch,(1974); Frehner, (1973); Gatewood, (1971); Latterly, (1976); and Threadgill, (1977) all carried out research into cognitive style and achievement in mathematics. The results of these studies present a relatively unified picture of the relationship between cognitive style and mathematics ability. Most of the cited research suggests that students with analytic cognitive styles perform significantly better than other students (analytic as defined by Kagan, et al. 1963, in their definitions of cognitive styles). Some research has slight variations; Branch, 1974, for example notes that low score analytic students performed significantly better on transfer measures when taught inductively. Overall, however, the picture appears clear that analytic cognitive style is associated with significantly higher performance in mathematics.

Such a clear distinction in the abilities of cognitive styles appears to support the idea that people with particular styles should be taught individually. The argument here is that they clearly have different abilities which probably demand different requirements from the environment. The work of Kolb (1984), and his recognition of the relationship between academic disciplines and learning styles, argues for particular cognitive performance based on learning style. This is elaborated in more detail in the chapter discussing the work of Kolb (see Chapter Three). The essence of Kolb's argument, however, is that learning style affects abilities, and in turn this will manifest itself in areas of study. Converger learning style students enjoy focusing down on a single correct answer. Kolb argues that, because nursing facilitates this, many nurses will have converger learning styles

as this exploits their abilities most effectively[3]. It appears in the research, from the specific study in the field of mathematics to the general perspective of Kolb, that there is a relationship between learning style and performance in various learning arenas. The studies cited so far research the different abilities of various cognitive styles. They do not actively research the issues of matching cognitive style with teaching style. From this research the conclusion that can be reached is that there appears to be a potential benefit of matching teaching to style. Other research must be found to discover if this potential can be realised.

The research on teaching style has not established the distinctive picture that has arisen surrounding the discipline of mathematics and cognitive style. Much of the research in this area divides teaching into two opposing methods, the discovery method and the expository method. These distinctions appear to be drawn more out of consideration for experimental convenience rather than the assumption that there are these two, or only two, teaching styles. What they represent is two ends of a continuum, each with the same goal but different methods of achieving this goal. The discovery method being closer to Rogers' student directed approach and the expository method aligning with the traditional transmission approach - these however, are not direct matches. The teaching sequence of the expository method starts with the actual concept to be taught, and this is the first point to be verbalised. This contrasts with the discovery method that only verbalises and presents the actual concept at the end of the session - after a 'journey' of discovery. Neither of these two methods has developed dominance; both have their advocates. Hendrix, (1947); Gagne and Brown, (1961); Swanson, (1949); Ray, (1961); Worthen, (1968), and Williams, (1974), all argue that the expository method is the superior method. This is diametrically opposed to the research of, Kittell, (1957); Kersh, (1957), and Corman, (1957), who argue that the discovery method is the better teaching method. Between these two positions the research has concluded that neither methods establish a significant difference

[3] The results of this study refute the claims of Kolb (citing the work of Plovnick, 1974) that learning styles are associated with a particular area of study, as no such associations were found. In turn these results would question any connections between learning style and profession. (problems with Kolb chapter nine.)

in student performance, Ausubel, (1961); Siegel and Seigel, (1965); Williams, (1974), and Thornell, (1977). The results of these studies are representative of the results of wider research into teaching methods where no one method, workshop, lecture, seminar, student guided reading has forged a dominance.

It would seem reasonable to conclude therefore that there is no 'golden' teaching method which benefits all students. This conclusion, far from undermining the aims of the study supports it, since students perform best when the needs of their cognitive style or learning style is matched to the teaching style. Research that does not take this into account will generate widely varying results.

Kolb (1984) argues that particular learning styles are associated with particular disciplines; for example, psychology students (regular subjects for research) are predominantly divergers. The diverger learning style, Kolb argues, takes specific features from teaching and benefits from particular learning activities, for example 'brainstorming' and imaginative creation of a meaningful gestalt. A diverger learning style, it is argued, will not perform equally well in all teaching environments. Variations in performance are not due to any particular flaw in a teaching style but rather that the qualities of a teaching style may not be appropriate to that style. It follows from this argument, therefore, that if learning style is not taken into account the results of any study investigating teaching methods will be affected by the random effect of matching and mis-matching.

The idea of matching learning styles to teaching styles is not a new one but has developed in parallel with the theory of learning styles.

> "When students are exposed to a teaching style which is consonant with the ways they believe they learn, they will improve their test scores, fact knowledge, attitude and efficiency, more than those taught in a manner dissonant to their style" (Domino, 1970, p70).

The demands for the matching of styles occur constantly throughout the research. It is even presented as a way of meeting the demands of falling budgets and staff student ratios because, theoretically, it should increase teaching and learning efficiency.

> "matching student learning style characteristics and complimentary methods and/or materials is one of the most potent responses to the public's demand for educational accountability. Using an appropriate learning style instrument to diagnose how the students learn is a professional requirement" (Dunn and Dunn, 1977, p 15).

Clearly, from the above citations, the matching of learning and teaching styles is perceived as more than desirable but as a necessity. It would contradict the aim of recognising student differences if ultimately they were all taught in the same manner. This is not to say that finding the most appropriate grouping will be easy. Learning styles and cognitive approaches to education are recognised as by far the best tools available to understand students' individual differences.

> "To bring students into one confining environment and to group them in any manner at all makes that makes educational sense is virtually an impossibility ... unless we examine each of these complex individuals and identify exactly how he or she is likely to learn most effectively" (Dunn and Dunn, 1977, p11).

Research into the active matching of learning and teaching styles within higher education is relatively sparse.

> "There has been much written about learning style in higher education, but little attention has been given in using Kolb's theory to the relationship of instructor's learning style, students learning style and student achievement" (Davis, et al. 1988).

Davis argues that there is a wealth of developmental research which would aid the progression of individualised teaching and learning programmes. Perry (1970); Erikson (1963); Bloom (1956); Chickering and Havighurst (1981); Levinson (1978); Neugarten (1968) and Kegan (1982) all present developmental research which could be used as a framework for identifying appropriate teaching methods. Despite Davis' convictions about the merits of matching of learning and teaching styles, the research she carried out did not support her convictions.

> "In an application of Kolb's theory to the classroom, matching the learning style of teaching and student should make a difference in how well the students do in that course. This did not prove to be the case in this study" (Davis, 1988, p10).

This result questions the validity of the present project as the aims and objectives of this study have clearly been contradicted by the results of Davis' study. However, Davis did present three major reasons which may explain why the results fail to fit with the hypotheses. Firstly the college where the study was undertaken operates a tight selection procedure and the students who finally arrive at the college are "used to achieving high grades and adapting to the style of the teacher when necessary" (1988, p10). Davis argues that the high level of motivation of these students allows them to shift their learning style, hence undermining any attempt to match learning style with teaching style. This is compounded by the fact that it was unclear as to the exact relationship between the lecturers' assessed learning style and the actual teaching priorities used during the lecture. Finally, the commitment to a particular style by lecturer was also unclear, hence the degree to which lecturers shifted their style during lectures was also unclear. The compound effects of these points upon the results of Davis' study could well account for the non significant results gained. Within the study undertaken by the present researcher these compounding variables will be taken into consideration and removed from the experimental arena. The university at which this study is based has an "flexible qualification policy" towards incoming students and accepts students who do not have traditional qualifications, as well of

those with A-levels. Work experience, access courses all form ways of gaining entrance to the university. The broad spectrum of students will not be open to criticism that they are all high achievers, with experience in flexing in order to accommodate lecturers' styles of presentation. The second and third reasons which Davis presents will not be an issue within this study because all the lectures will be presented by the experimenter. Any notion of individual differences in lecturers or relationship between the assessed and the practical implementation of styles will be removed. These adaptations in the design of this study support the further investigation of 'matching' of teaching and learning styles. This study takes account of the recommendations which Davis presents at the end of the research.

> "Based upon the results of this study, several recommendations are offered:
> 1. Further research examining the relationship of teacher's learning style to classroom procedures and activities.
> 2. Further research examining the relationship of teacher learning style and student learning style using teachers spanning a wide range of academic disciplines in diverse institutions" (1988, p11).

From the research the study of matching learning styles with complementary teaching styles seems not only theoretically sound but also a necessity if the implications of learning styles are to be fully exploited. If teaching styles are not mapped onto learning styles in order enhance or facilitate more effective learning, then the whole notion of identifying learning styles comes under question as far as improving teaching is concerned.

Brief guide to Kolb's theory of experiential learning and learning styles.

This guide offers an overview to Kolb's experiential learning theory and learning styles. It is presented to allow anyone new to David Kolb's work to understand the significance of his intellectual heritage and the development of experiential learning and learning styles. Experiential learning and learning styles will be examined in more detail within this chapter. This initial section is designed to introduce Kolb's key terms and theories.

Experiential learning.

For Kolb learning is a developmental process which occurs in a series of stages. For effective learning to occur a learner must move through all four stages (1984, pg. 38). The diagram below shows how Kolb presents these stages in a cyclic pattern which feeds back on itself.

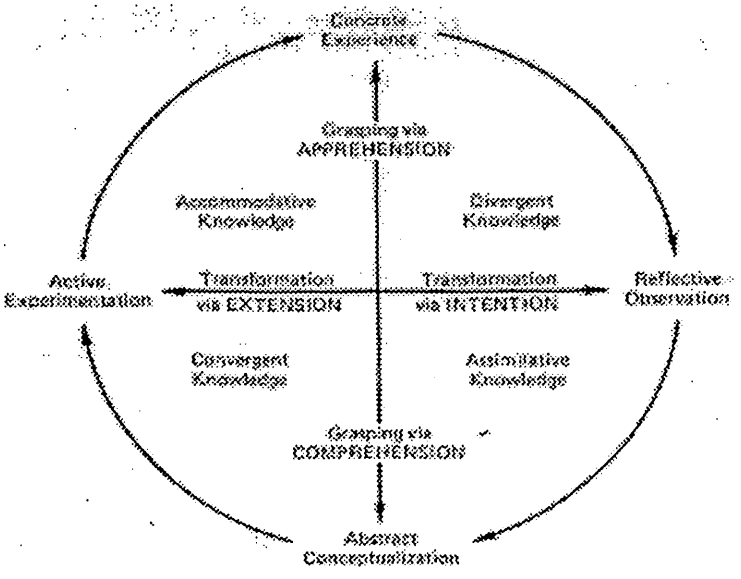

Figure 1.1 Showing the outline of Kolb's learning cycle and the relationship between the learning modes.

A learner can theoretically start at any point on this cycle, for example the learning process can start with a theory (Abstract conceptualisation). This theory will then be tested (Active experimentation). The results of the testing will be applied to relevant activities (Concrete experience) and based on this practical experience the learning will be reflected on (Reflective observation). This may confirm the original theory or produce new questions which will be reformed into theories. This completes the cycle and moves the learning process round to abstract conceptualisation again. It can be seen from this process that all the stages are of equal importance within learning and if one stage is completely removed then learning will be compromised. If, for example, active experimentation was removed learning would always be speculative based on the theories of abstract conceptualisation but never rigorously tested.

Dialectic Tensions.

Within Kolb's theory of learning he presents two dialectic pairs, ways of approaching learning which are essentially opposite to each other. Each dialectic pair comprises two learning modes, or ways of adapting to the learning environment. In the vertical plane of figure 1:1, there is dialectic coupling of concrete experience and abstract conceptualisation. These show how an individual can emphasise what they know to be 'true' (Concrete experience) or what they 'believe to be true' (Abstract conceptualisation). The second dialectic pair, in the horizontal plane, appears in figure 1:1. Here Kolb focuses on reflective observation versus active experimentation. This is where learners judge the validity of what has been learnt by practically testing it out or comparing it with the theories which are already known. These dialectic tensions must be resolved within any learning and the way in which the tensions are resolved indicate a learner's approach to the learning environment or learning styles. It is this that links the theory of experiential learning to the theory of learning styles - which are analytically distinct.

Learning Styles.

As noted learning styles are a product of the way in which a learner resolves the conflicts within learning. Effectively the learner emphasises two of the learning modes, one from each dialectic pair. There are four ways in which a learner can resolve the conflicts within learning.

Table to show how learning styles relate to how the learning mode conflicts are resolved.

An Emphasis of	Learning style produced
Concrete experience - reflective observation	Diverger learning style.
Reflective observation - abstract conceptualisation	Assimilator learning style.
Abstract Conceptualisation - active experimentation	Convergent learning style.
Active experimentation - concrete experience	Accommodator learning style.

Table 1.1 Table to Show the connections between Kolb's learning modes and learning styles.

Kolb recognises within his theory that a learner will potentially be able to resolve the learning conflicts in any of the learning styles. However, a learner will develop a dominant learning style which will be emphasised over other possible ways of resolving the tensions within learning. This emphasis will be as a product of both the learner and the environment in which they learn. It can be seen from figure 1:1 that some information is characterised as requiring specific approaches from the learner. For example, divergent knowledge requires that the learner does not focus on a single answer but rather expands their approach to bring in many and varied possibilities. Hence the learner and the environment interact to establish a learning style within an individual learner.

Summary of Kolb's experiential learning.

The following points are the major issues within Kolb's experiential learning theory:

1. Learning is a cyclic process.
2. Any learning experience is tension filled - these tensions must be resolved in order for learning to occur.
3. Due to the demands of the environment and qualities of the learning, styles of learning develop. These are stable ways in which the learner resolves the learning tensions.

Foundations of Kolb's experiential approach to learning.

Kolb asserts that exponents of experiential learning have set themselves in opposition to the behaviourists. Behaviourism dominated early Anglo - American psychological thought from the 1930s through into the 1960s and still remains a prominent voice within the discipline. Behaviourists according to Kolb established an approach to psychology and the understanding of people that fails to value personal individual experience.

> "... our concept of the learning process itself was distorted first by rationalism and later by behaviourism. We lost touch with our own experience as the source of personal learning and development and, in the process, lost experiential centeredness necessary to counterbalance the loss of 'scientific' centeredness that has been progressively slipping away since Copernicus" (1984, pg. 2).

Kolb adopts an approach to learning which emphasises the role of the individual in the learning experience; the dynamic interplay that exists between what is learnt and who is learning. In establishing his position Kolb claims to draw on three main sources Piaget, Dewey and Lewin. Essentially Piaget contributes the developmental nature of Kolb's theory (1984, 23-24); Lewin the phenomenological perspective and cyclic nature (1984, pg. 21); and Dewey the pragmatic emphasis which is stamped upon Kolb's theory (1984, 23).

Certainly Piaget's work with concrete interpretations of the world, which via experience eventually develop into abstract interpretations, can be seen in Kolb's development of different modes of learning, that is, concrete experience and abstract conceptualisation. It must be noted that Piaget presents a shift from the concrete to abstract, with the abstract processing being a more advanced approach to learning. Kolb however, has both concrete and abstract approaches playing an equal role in any learning experience.

Connections between Piaget's work and Kolb can be seen in the treatment and application of the theory. Piaget's work has been used to shape approaches in much the same way as this study does with Kolb. This study aims to investigate whether the learning styles identified by Kolb can be used to significantly affect the learning experience of the students. Bruner (1966) took a similar line with Piaget's work. He identified how the stages of development that Piaget had identified could be used to devise teaching strategies and curricula which would allow material to be taught effectively at a given stage. He argues that it was not the subject matter that prevented learning but rather the mode of presentation which interfered with effective learning. He attempts to implement the theory in order to improve the learning process. The aims of Bruner are the same as the aims of this theory apart from the fact Bruner is using Piaget as his theoretical basis. The limitations of Piaget work are recognised by Kolb and earlier researchers. Perry (1970), and Kohlberg (1969) both saw that Piaget's theory of development meant that the development of approaches to learning stopped in late adolescence. Perry argued for development during the college years in both intellectual and ethical spheres, development that may never be fully completed, indicating that development could occur throughout life. Although Piaget's[4] limitations are recognised by Kolb the intellectual heritage is clear and much of Kolb's notion of a developmental basis to learning can be traced to Piaget's theories of cognitive development.

Lewin's work (1951) brought to Kolb's theory of education the notion of a multi-stage approach to learning, where data is transformed through a series of stages, from external information into 'known' information. This can be seen in Lewin's model of action research. This presents a cyclic pattern which starts at concrete experience, moves to observation and reflection and develops into the formation of abstract concepts and generalisation. Finally these concepts are tested and implications considered. Once this final stage of the research cycle has been

[4] Although Piaget may present the on set of his final stage of development beginning in adolescence, this does not mean that development stops during adolescence, but rather any development that occurs from this age onwards exists within this final stage.

completed the whole process can start again with the concrete experience gained during the testing of the concepts. This introduces the idea of a cyclic pattern to learning which is self supporting and inter-reliant. No one part is more or less important that the other (moving away from Piaget's notion of a development from concrete to abstract cognition). It also introduces the importance of personal experience within education, rather than the learning of known facts which are immutable and exist outside the individual. Lewin's approach to learning gave place to the individual within the learning process, presenting them as the controlling factor within the cyclic pattern that is learning (1984, pg. 21).

Within Kolb's theory of learning there is the notion of balanced tension between the two dialectically opposed approaches to learning. The need for the resolution of such tensions in order for effective learning to occur can be seen in the work of Dewey (1938). For learning to progress Dewey argues that a balance has to be achieved between ideas and impulses. "The intellectual anticipation, the idea of consequences, must blend with desire and impulse to acquire moving force. It then gives direction to what otherwise is blind, while desire gives ideas impetus and momentum" (1938, pg. 69) Within Dewey's work origins can be seen for Kolb's recognition that learning is a dynamic process which requires learners to shift between distinct components. A series of elements and the total of these elements is more than the sum of the parts. Kolb presents effective learning as the product of the movement through the whole of the learning cycle and where the learner has engaged with each stage. Dewey's conception of learning is very similar where it is the product of the balanced inter-relationship between the desires and ideas elements with neither one being sufficient for learning to occur. Within Dewey's work the developmental aspect of learning is also clearly present. Dewey works with impulse, observation, knowledge and judgement. Although Kolb does not build directly on these categories, clear foundations can be seen. These categories differ from Lewin's cyclic pattern of learning. As Dewey indicates, once a person has been through the four stages of impulse, observation, knowledge and judgement they do not return to the original impulse but rather they return to a new impulse that is somehow developed from the original one and

thus emphasising the developmental nature of learning (1938, pg. 38). This is something which although not obvious from Kolb's learning cycle (which perhaps would better fit Kolb's position if it was viewed as a learning spiral) is inherent within his theory of learning. Simply put Kolb presents learning as a developmental process, where experience continually modifies our understanding (1984, pg. 26).

It was noted at the beginning of this section that Kolb argues that experiential learning was established in opposition to behaviourist approaches to education. Not only are the explanations of learning distinct but the underlying epistemological perspectives on what the knowledge is based are also different (1984, pg. 20). Kolb claims that behaviourists view knowledge as the residue of sensory experience. Sensory information remains constant, in the tradition of Locke (1984, pg. 26). Due to the fixed nature of this knowledge it is possible for it to be objectively learnt and the effectiveness of the learning be measured. The variations in knowledge, according to behaviourists, are not established by different interpretations of the knowledge (as knowledge is perceived as being fixed), rather the constants that form knowledge are combined in different ways which establish various patterns of thought. If this understanding of knowledge is accepted then the traditional transmission[5] approach to learning would appear to be the most logical. It provides a framework where the information can be transferred effectively without it being corrupted by subjective interpretations. However, experiential learning is associated with a completely different epistemological perspective on education. Here knowledge is the product of learning and is open to variations as it is constantly formed and re-formed through experience. There is no universal knowledge that is constant. Nothing about knowledge is immutable. For supporters of experiential learning, any learning which is undertaken in a rigid behaviouristic frame work is maladaptive as it is finite. Such learning denies what is central to experiential learning, that is, the

[5] Traditional transmission here is used to refers to an approach to learning where there is a known set syllabus of accepted information which must be passed over to the students. This is most frequently done via the lecture where the students notes the information in order that it can be reflected at a later date.

effect of future experience on what has been learnt. Kolb asserts experiential learning both establishes its own approaches to learning and its own distinct epistemological priorities concerning the knowledge which is to be learnt. If the experiential position is adopted the one-way nature of traditional education becomes problematical. Such transmission requires that there is a set knowledge which can be broadcast. Experiential learning demands interaction in order to create the knowledge, interaction which is denied by traditional one-way transmission approaches (1984, pg. 26). Behaviourism, according to Kolb also decontexualises learning[6], a context which is central to the establishment of knowledge in the learning situation. Kolb notes that the ideals needed for a behaviourist perspective on education to be truly effective could only ever exist in a utopian state. Kolb argues that when Skinner wrote Walden II (1948) it was effectively an essay on the best way to apply his theory. A theory which Kolb argues is not practically possible or useful.

The consequences of the position which Kolb adopts are that learning can no longer be viewed as something that exists only within academic institutions, a process that is undertaken in school in the formative years of life. Experiential learning is a life long process and a constant process. If this is accepted new approaches to teaching must also be accepted where the importance of learners and their interpretation of any learning experience is taken into consideration. Experiential learning demands a shift way from learning or 'absorption' of knowledge to the "creation of knowledge". This view would be completely alien to a behaviourist.

From Kolb's historical antecedents and personal epistemology an understanding of what his view of learning is can be proposed Kolb defined learning as being made up of four main features.

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[6] This appears to be a complaint about the laboratory nature of the behavioural approach to science, the notion that what it studies is far from what a person may experience. Skinner argues, "Obviously we cannot predict or control human behaviour in daily life with the same precision obtained in the laboratory but we can nevertheless use results from laboratory to interpret behaviour else where" (1974, pg 228).

- Firstly Kolb presents learning as a process of adaptation to social and personal knowledge, rather than a process which is purely focused on outcomes or content.
- Secondly knowledge is continually created and re-created in a personal exchange with the learning environment, not independently acquired or transmitted.
- Thirdly learning transforms experience in both objective and subjective forms. Hence no learning environment has a given meaning or experience and the perceived environment itself is change by the learning process.
- Finally learning can only be understood when the nature of knowledge is understood and vice versa.

What has been presented so far are the intellectual origins of Kolb's work which has built upon to establish Kolb's perception of learning and knowledge. The conflict which exists within learning is central to Kolb's position, firstly because the tension is caused by the fact that knowledge is created not just received. This recognises the personal nature of learning, which requires active participation on behalf of the learner, emphasising the phenomenological aspects of acquiring knowledge. Secondly the dialectic tensions and how they are resolved are at the root of Kolb's learning styles. Essentially Kolb's learning styles could be seen as the processes of internalisation of knowledge. This emphasis on internalisation distances Kolb's theories from behavioural approaches which would have difficulty in fully recognising the necessary internalisation.

Kolb's establishment of learning styles within experiential learning theory.

The major way Kolb attempted to recognise the role of the individual within learning was with the use of learning styles. Although Kolb recognised there were potentially limitless interpretations of experience he argued that essentially learning situations would be resolved in accordance with the main characteristics

of his four learning styles. The learning styles represent how an individual resolves the conflicts that are inherent within any learning experience.

> "Learning requires abilities which are bi-polar opposites, and the learner, as a result, must continually choose which set of learning abilities he or she will bring to bear in any situation" (Kolb, 1984, pg. 30).

As the learner is constantly demanded to make such decisions patterns emerge as a product of both the demands of the environment and the learner's own preferences. These decisions result in the learner eventually establishing an approach to how they resolve learning situations; this becomes their learning style. Kolb does not argue that a learner with any given style can only solve learning conflicts in that style but rather it is the way in which they prefer to address the learning environment[7]. Essentially Kolb perceives learning as a "Holistic adaptive process" (1984, pg. 34) which incorporates all approaches to learning, yet within this he is able to recognise that learners will establish a dominant ability in a single learning style.

Following research and clinical observation, Kolb established the following learning styles, Converger, Diverger, Assimilator and Accommodator. He describes and assigns the following characteristics to his learning styles:

- The convergent learning style relies primarily on the dominant learning abilities of abstract conceptualisation and active experimentation. The greatest strength of this approach lies in problem solving, decision making and the practical application of ideas. We have called this learning style the converger because a person with this style seems to do best in situations such as the conventional intelligence tests, where there is a single correct answer or solution to a question or problem (Torrealba, 1972; Kolb, 1976). In this

[7] Although Kolb argues that a style is only a preference and a learner is free to use other styles this point is rejected by this study and arguments are presented to explain why learning styles are vastly more rigid then Kolb acknowledges. (see pg 232 - 253).

learning style, knowledge is organised in such a way that hypothetical-deductive reasoning, it can be focused on specific problems. Liam Hudson's (1966) research on those with this style of learning (using other measures than the LSI) shows that convergent people are 'controlled' in their expression of emotion. They prefer dealing with technical tasks and problems rather than social and interpersonal issues.

- The divergent learning style has the opposite learning strengths of convergence, emphasising concrete experience and reflective observation. The greatest strength of this orientation lies in imaginative ability and awareness of meaning and values. The primary adaptive ability of divergence is to view concrete experiences from many perspectives and to organise many relationships into a meaningful "gestalt". The emphasis in this orientation is on adaptation by observation rather than action. This style is called the diverger because a person of this type performs better in situations that call for generations of alternative ideas and implications, such as "Brainstorming" idea sessions. Those oriented toward divergence and interested in people tend to be imaginative and feeling-oriented.

- In assimilation, the dominant learning abilities are abstract conceptualisation and reflective observation. The greatest strength of this orientation lies in inductive reasoning and the ability to create theoretical models, in assimilating disparate observations into an integrated explanation (Grochow, 1973). As in convergence, this orientation is less focused on people are is more concerned with ideas and abstract concepts. Ideas, however, are judged less in this orientation by their practical value. Here, it is more important that the theory be logically sound and precise.

- The accommodative learning style has the opposite strength from assimilation, emphasising concrete experience and active experimentation. The greatest strength of this orientation lies in doing things, in carrying out plans and tasks and becoming involved in new experiences. The adaptive emphasis of this

orientation is on opportunity seeking, risk talking and action. This style is called accommodation because it is best suited for those situations where one must adapt oneself to changing immediate circumstances. In situations where the theories or plans do not fit the facts, those with an accommodative learning style will mostly likely discard the plan or theory and deal with the facts. (With the opposite learning style, assimilation, one would be more likely to disregard or re-examine the facts.) People with an accommodative orientation tend to solve problems in an intuitive trial and error manner (Grochow, 1973), relying heavily on other people for the information rather than on their own analytic ability (Stabell, 1973). Those with accommodative learning styles are at ease with people but are sometimes seen as impatient or "pushy".

The descriptions Kolb gives of the four learning styles are clear and precise. Most people while reading them identify with a learning style or at least some of the characteristics of a learning style.

Despite this welcoming face validity it is important that the foundations of these distinctions between learning styles are investigated before further work is built upon them. Kolb turns to work on personality types to ground his learning styles and psychological characteristics which they represent.

Learning styles and personality.

The learning styles which Kolb presented are not just ways in which students approach the 'intellectual' learning environment. They rather represent how people would behave in a variety of situation, which may not traditionally be perceived or labelled as learning situations. Hence how people choose to socialise or interact with the environment will reflect their learning style. It is not a great shift from here to recognise that learning styles must therefore relate to personality type, as these are generally used as means of noting different

categories of interaction with the environment. Kolb went to great lengths to draw out the connections between his learning styles and Jung's personality types (1923)[8].

Jung identified four basic functions, four different ways in which people reacted to their environment. Sensation and intuition distinguished alternative way in which people perceived their environment (what Kolb asserts is prehension). Thinking and feeling were presented as two different ways in which people could make judgements about the world (what Kolb asserts is transformation). Jung argued that via transactions with the social environment people are rewarded for one or other action and thus develop individuality. This encouragement was not unitary. Being rewarded in thinking did not mean you were not rewarded in feeling, the two could be reinforced independently of each other. This progress was viewed as a developmental process which allowed society to meet the changing demands that were placed upon it. Without this ability to change and specialise, Jung argued that society would not be able to survive. Hence the ability of an individual to specialise is an important factor in the development of society as well as the development of the individual. Jung described this specialisation as being "automatically moulded" into a person by a process of both nature and nurture. (Kolb's work has strong echoes of this nature-nurture influence, with the recognition of both inherited predisposition and developed learning histories.) This emphasises a predisposition to a given mode of perception yet allows for this to be adapted by the environment in which the individuals finds themselves. The dimensions put forward by Kolb map directly onto those of Jung as seen in table below.

	Jungian Dimension	Kolbian Dimension
Apprehension	Sensation - Intuition.	Abstract - Concrete
Comprehension	Thinking - Feeling	Reflection - Active Exp.

Table 1.2 Table to Show the connections between Kolb's and Jung's Basic concepts.

[8] The connections which are present here are those which Kolb argues exist between his work and that of Jung's. However, this study rejects the arguements Kolb presents and the connections they claim. (see pg 215 - 227).

Jung recognised within his personality theory that if a person was to be able to fully and completely be able to engage with all possible environment they would have to be competent in all dimensions. Jung noted that "Evidently one alone is not sufficient, since the object seems to be partially comprehended" (Jung, 1923, pg. 28). A problem which Kolb recognised with items that were only prehended, anything that was processed to this level was not fully understood or learnt. To overcome this problem Jung recognised that the abilities from his four functions should be blended in 'equal measure', for Jung this would result in the development of 'perfect adaptation'. Here Jung argues for an ideal type, which examples can only ever be a pale reflection of. The ideal being sought is the equal development of all four abilities into a rounded personality. Kolb rejects the whole notion of their being a theoretical ideal and the idealist philosophies it incorporates. It is worth noting however, that if all people did achieve perfect adaptation (within Jung dimensions) then the specialised skills which result as a consequence of developing specific types would be lost in favour of generic abilities. This would therefore potentially limit the development of society, as no person would have developed specific skills to meet the differentiated, specialised roles required for maintenance and the development of culture and society. However, Jung accommodates the difference between the ideal (and its potentially limiting effects) and the reality within his theory. In order to develop perfect adaptation an individual has to actively engage with shaping their approach into a whole; such positive action is rare. Jung puts forward the pragmatic point that in the development of personality types "like everything else in nature, follows the path of least resistance" (1923, pg. 28). Hence individuals are likely to follow the ways in which they adapted in early childhood, thus strengthening these approaches at the expense of others. This process finally results in distinct personality types which engage with the environment in distinct ways.

Kolb maintains that the compromise position which Jung reaches in the development of personality types reflects the same degree of developmental

flexibility which Kolb wishes to demonstrate within his learning style theory[9]. In this way the personality types can be shaped by the adaptive functions which have been exploited. Thus the adaptive processes are active in their shaping of personality types, just as they are in the shaping of learning styles. Once a person has formed a specific learning style then they can change and will change depending on the adaptive process which they exploit to understand the environment around them. Thus learning styles or personality types are the end results of the adaptive processes.

Links between Jung and Kolb.

- Both attempt to explain the human adaptive processes.
- Both attempt to predict behaviour based on the categorisation of individuals.
- Both recognise that over time a person has the potential to shift between categories.

Kolb recognised that the links between the two theories could be perceived as being purely at a surface level and that more fundamentally they were different. It was important for Kolb to demonstrate that there were links between the two measures at the more fundamental level and that they did draw upon the same psychological distinctions between people. The main benefit of doing this would be that Kolb's theory would gain validity for its constructs by drawing on the same psychological features as Jung.

Jungian types can be assessed using the Myers - Briggs Type indicator (MBTI), a self-report instrument that is commonly used to measure a person's orientation within Jungian theory. If the scores on this test correlate with the scores on the

[9] During the this study the flexibility of Kolb's learning styles has been shown to be highly problematic. The theoretical basis for flexibility is contradicted by Kolb's own use of Tyler's 'Possibility Processing' (1978) a theory which leads to stability not flexibility. Where as the empirical data suggests that learning styles are more flexible than Kolb states. These issues are further discussed in chapter nine.

LSI, this would give a degree of empirical support for the relationship between the learning styles proposed by Kolb and Jung's personality types. Kolb cites the research of Margerison and Lewis (1979) as support for his position. Margerison and Lewis carried out a study investigating the relationship between Learning Style Inventory (LSI - a forced choice rank ordering questionnaire developed by Kolb to measure learning styles) and MBTI. A positive correlation of $0.45(p<0.01)$ was found between the two sets of test scores, supporting Kolb's claim that LSI scores drew on the same fundamental individual differences as Jung's personality types. It must be noted however, that the Myers - Briggs type indicator is a self report indicator. Hence the significant results gained are measuring whether the participants taking the test agree that the items on the LSI measure the same concepts as Jung's dimensions. The actual behaviour of the participants is not measured. Considering Margerison and Lewis's result Kolb does appear to be justified in claiming at least a degree of support for his argument that his learning styles draw on the same basic psychological features as Jung's types.

Kolb's perspective on knowledge and learning.

It is important within the generation of any theory concerned with learning that a clear understanding is gained of what constitutes the knowledge that is to be learnt. How the knowledge is perceived directly impacts on the theory of learning that is developed. Kolb presents three possible perspectives on knowledge (each representing a distinct position). These three perspectives were first presented in Piaget's texts "Genetic Epistemology" (1970).

- Empiricist view that information is discovered by a learner and is new to them, but the information exists in the external reality already.
- Naturists'/ rationalists' view that knowledge is predetermined within a discipline.

- Genetic epistemologists view that knowledge as constructed as each learner establishes an understanding. As the people learn they develop structures that did not exist before either in the external world or learners' minds.

Even within this brief and far from comprehensive list of positions on knowledge it becomes apparent that how knowledge is viewed will impact dramatically on the establishment of any theory of learning. An empiricist would develop a model of learning which would facilitate the learner being able to 'sense' the world as objectively as possible, along with a strategy to collate and store all the relevant information. Such a theory of learning would not be appropriate to the genetic epistemological position, which would not value as highly the ability to objectively sense the world, as this act in itself represents only part of the approach to knowledge. For Kolb a learner can also gain knowledge by theorising about experience and does not just record sensations, within Experiential learning Kolb presents these other approaches as equally necessary components of learning.

The empiricist position can be seen within the development of the physical sciences. Here the objective of any study is to be able to faithfully record the environment and avoid all possible sources of bias. The more faithfully the environment is recorded, the closer the experience to gaining a 'true' understanding of world. Within an empirical approach to learning it is necessary to view the mind as a 'tabula rasa'. It is able to faithfully record the sensory information but no demands are made of it to manipulate the information in any way. The empiricists view the objective world as primary within all approaches to learning.

The rationalists are in opposition to the empiricist approach. They value most highly the application of logic and reason, not experience. For the rationalists 'cognitive ideals' are the primary features which give meaning to experiences. Such experiences, however, are imperfect reflections of these ideals. According to Kolb, neither the rationalist nor the empiricist position is appropriate for

experiential learning since far too much emphasis is placed on any single mode of establishing knowledge. If experiential learning theory is to be exploited it must be done in conjunction with a theory of knowledge which is not limited to a single perspective. Piaget's theory of genetic epistemology comes closest to this compromise position, with its emphasis on the creation of knowledge. 'Truth' is what is established by the individual as they engage with the environment, it is not prior to their learning engagement but rather is a product of their engagement.

The main point of contact between experiential learning theory and genetic epistemology is the interactionist approach of both theories. The approach of the two theories, however, is by no means identical. Piaget places a far greater emphasis on a rationalist approach in which sensation is placed in a secondary role. Kolb tries to establish a position which emphasises both approaches equally. The concrete experience phase exhibits many of the qualities of an empiricist position, with the grasping of reality via direct experience. This contrasts with the abstract conceptualisation phase with its emphasis on interpreting experience, a characteristic which is in common with the rationalist position. Clearly Kolb's position on knowledge is a composite which emphasises elements from a number of positions to create a holistic position. The single strongest element within Kolb position however, is the interactionist element, as it is this which creates the whole and holds the other elements together in a coherent theory, which is *Experiential Learning*. Hence, via interaction of both theorising and direct experiencing, knowledge is established.

Two Types of Knowledge.

During Kolb's development of his theory of learning he unpacks the actual learning process in order to discover exactly what is being transformed and what are the sources of the tensions within learning. His aim was, "To identify the essential and enduring aspects of human learning process" (Kolb 1984, pg. 40). Kolb identified two distinct types of 'knowledge' within learning; apprehension

and comprehension. Kolb distinguishes between the two. He identifies apprehension as the lived experience which is transitory in time and space and comprehension as 'the known' experience which is enduring in time and space. At first it appears that these are semantic distinctions about experience but Kolb is able to demonstrate that they are different ways of knowing. The colour blue according to Kolb is always apprehended, in that it can only ever be experienced and never truly known in an external objective sense. Blue could not be explained to a blind person because in order for blue to be known it has to be experienced. Comprehension however, moves the experience into the 'known' sphere, this usually as a result of a common language or other form of symbolic representation. Comprehension allows experience and knowledge to be communicated to others and recorded.

> "If you stop reading this ... get up from the chair, and leave the room, your apprehensions of that situation will vanish without trace (substituted by apprehensions of the hall way or whatever new immediate situation you are in). Your comprehension of that situation, however, will allow you to create for yourself and communicate to others a model of that situation that could last forever (Kolb, 1984, pg. 43).

Apprehension and comprehension bring to the learning experience distinct qualities. Apprehension brings infinite variety and nuance whereas comprehension brings the power of communication and a level of stability within our experience. Both, however, exclude the other. Apprehension is experience at the cost of stability and communication and vice versa for comprehension.

These ideas about the two forms of experience are not distinct to Kolb. He uses the work of Feigl to support his distinctions although the same basic distinctions can be traced back to at least Kant's distinctions between concepts and intuitions. Feigl (1958) refers to there being two different forms of language, each of which represents a different type of knowing. For Feigl there is 'phenomenal language' which refers to the qualities of the experience, this links with Kolb's notion of

apprehension. This contrasts with 'physical language' which is descriptive and symbolic and closely links with Kolb's comprehension. Kolb is tapping into a relatively well defined distinction in experience when he notes the differences between apprehension and comprehension.

Neurological Support for Two Types of Knowledge.

Kolb attempts to gain support for his learning styles not only from other theories of learning but also neurological functioning of people. He turns to the work on hemisphere specialisation in neuro-psychology to provide a physical manifestation of the different types of experience. Citing the work of Sperry et al (work carried out throughout the 1960's) Kolb looks to the studies of the processing abilities of patients who have had their corpus collosum severed. (This in effect makes the two cerebral hemispheres two separate functioning units.) Sperry clearly demonstrated that if two pictures were shown simultaneously to each eye of a split brain patient and various questioning strategies were exploited, differences in the approaches to processing information between the cerebral hemispheres could be shown. Information processed by the left hemisphere focused on language and naming of objects, working in a way to establish comprehension of the experience. In contrast, information processed by the right eye more closely focused on manipulation of objects, spatial awareness and identifying relationships between things. There appear to be strong links between these two abilities and the two different types of experience noted by Kolb. Comprehension would appear to be a product of the left hemisphere, whereas apprehension is a product of the right hemisphere. Distinctions between hemisphere abilities were noted by other researchers in the field, such as Edwards, (1979); and Benton, (1980).

A note of caution is worth adding here that the studies Kolb cites are essentially those which exploit the investigation of an abnormal brain. In these studies a major neural highway, contain billions of neural fibres, has been severed. Hence

it is highly unlikely that the brain will function normally. It should be recognised, however, that patients who have had the corpus callosum severed as treatment for severe epilepsy do function in a more normal manner. Despite the fact that split brain studies might not reflect the actual operation of a fully functioning human brain these studies clearly show that the brain is able to process experiences in distinct ways and that these abilities may be cited in specific areas of the brain. Due to the neural highway that exists in fully functioning brains the clear distinctions in processing in split brain studies are lost. Kolb recognises the speculative nature of much of the research in this area but goes on to state that,

> "...but their description and recognition as representative of the dual-knowledge epistemology of experiential learning" (Kolb, 1984, pg. 49).

Summary of Apprehension and Comprehension.

Kolb places an importance on the relationship between apprehension and comprehension. With Kolb's theory of learning apprehension and comprehension have equal roles with neither one seen as the source of 'true' or 'proper' knowledge. This position may appear obvious in the light of Kolb's learning cycle, yet it is a departure from a long history which has viewed apprehension as a lower form of processing than comprehension. Piaget clearly indicated that apprehension and all its associated concrete tendencies was a step on the way to full adult processing, which is abstract and symbolic, like comprehension.

Neither apprehension nor comprehension is a product of Kolb's theory. What Kolb does develop from many perspectives is the co-equal relationship which he presents for the two forms of knowing. This balance is not to be found in many other positions. Behaviourism and the logical positivism, argue that ultimately empirical evidence can be found for all knowledge. The role of subjective apprehension in such an approach is severely limited if not completely excluded. The vast majority of the theory therefore is based on comprehension. A challenge

was made to the dominance of comprehension within behaviourist and positivistic theories by Polanyi (1958) who argue for an absolute dominance of apprehension within our establishment of knowledge. Yet such a shift only acts to create a new bias in the perception. Kolb viewed Polanyi's work as "... an equally dogmatic embrace of apprehension". A 'partial scepticism' is what Kolb believes is needed when dealing with either apprehension and comprehension, a scepticism that can only be diminished when tested against each other. For Kolb apprehension gives us personal knowledge which establishes us as individuals and distinct entities. Comprehension gives us social knowledge which allows the development of and means of exchanging knowledge with those around us.

Transformation of Knowledge.

Comprehension and apprehension represent the two ways of experiencing the world within Kolb's theory. Once the experience has occurred it is necessary that the experience is transformed in the quest for meaning, meaning which must be established if the encounter is to be a source of learning. For Kolb the experiences of life need to be grounded, this can be done in one of two ways, the experience can be related to personal experience by reflection, this is called by him 'intention'. Extension can also have the effect of grounding an experience by establishing its relationship with the lived world via direct action.

> "Learning, the creation of knowledge and meaning, occurs through the active extension and grounding of ideas and experiences in the external world and through internal reflection about the attributes of those experiences and ideas" (Kolb, 1984, pg. 52).

Again Kolb acknowledges that the foundations of these methods of transforming experience can be seen in earlier work. In particular he notes that Piaget (1971) works with the same basic concepts. Piaget refers to the transformation processes as the operative aspects of thought. There being two types of operation,

'behavioural' and 'intellectual'. Piaget did place limitations on what types of thought could be transformed by what operator. Theoretical mathematics or logic is processed via intentional transformation, and more concrete issues are transformed via extensional transformations. Piaget's work also places a greater emphasis on reflective transformation processes, presenting these as superior forms of processing. Such distinctions or hierarchies of transformation processes do not exist within Kolb's work. The different forms of transformation are created as a result of the different types of experience available and the relative appropriateness of one act rather than another in processing the information.

This denial of a hierarchical relationship between the two types of transformation relates to Kolb's view that the processes are actively independent and the need for grade distinctions is not appropriate. Kolb argues that Jung's two basic types of introversion and extroversion, exhibit the same non-hierarchical relationship, for Jung did not present one as superior to the other but rather different ways of processing the information. (It should be noted that the recent high valuing of extroversion and associated characteristics in the West has had the effect of making extroversion appear superior, this distinction is not present in Jung's original work.) Kolb perceives that Jung's two personality types are effectively the result of transforming information about the world in a distinctive pattern. The actions and processing of an introvert were dominated by intentional transformation, when the experience is also internally reflected whereas the extrovert relies on externalising experience hence transforms information via extenuation. Clearly relating and tying his methods of transformation to the work of Jung adds academic weight to the distinction in processes that Kolb is presenting.

Stability of Transformation.

It is important for Kolb and his learning style theory that the means for transformation chosen by any one individual remain relatively stable. This is

because it will add reliability to the distinctions he makes between learning styles. The stability that Kolb seeks flies in the face of the developmental and hierarchical approach presented by Piaget. Piaget argued that the transformation processes and general perception of the learning experience would change with age, thus undermining any notion of stability within the approach to transformation. Kolb argues for a compromise position which allows the required stability for the distinction of learning styles but recognises the changes that can occur within approaches to learning. Kagan et al (1970), working with constructs based on Jung's introversion and extroversion, noted that the level of reflective engagement with the learning experience increases with age between 5 and 11. This concurs with the position adopted by Piaget that the processing of experience develops with age. Kagan notes, however, that the position of any child with reference to the group remains stable and that any given learner's approach to learning can be generalised across time. This Kolb argued provides the required stable platform on which to develop his learning styles, a platform that is not immune to development but remains relative stable.

Biological Support for Transformation.

Once again Kolb seeks support for his transformation theory that transcends philosophical debate and manifests itself in the physical make-up of the functioning person. The concept of extension could be paraphrased as being a physically active approach to the development of knowledge, whereas the concept of intention could be similarly paraphrased as being physically inactive approach to learning. Standard understanding associates the sympathetic nervous system with motor functioning which allows us to engage with the surrounding world. The para-sympathetic nervous system is commonly attributed to controlling the body's state of equilibrium and reducing the body's state of arousal. The two systems are commonly antagonistic to each other, one increasing the state of arousal, the other reducing the state of arousal and maintaining bodily functioning. Kolb referred to Broverman et al's (1968)[10] discussion concerning the effect of inhibition or stimulation of these two systems on learning. They found that drugs which act to increase activation either by stimulation of the sympathetic nervous system or inhibition of the para-sympathetic nervous system were associated with increased effectiveness in dealing with perceptual or motor tasks, such as test of visual acuity. There was also a decrease in perceptual restructuring, that is relating disparate parts into a coherent whole. The opposite was true for drugs which decreased arousal either by inhibiting the sympathetic nervous system or by stimulating the para-sympathetic nervous system. At no point does Kolb argue that the para-sympathetic nervous system and the sympathetic nervous system control how information is transferred. He does argue, however, that there are distinct approaches to transforming information which are associated with different abilities within the learning environment.

[10] It should be noted that the work of Broverman et al (1968) was a highly speculative piece, which although presenting some challenging ideas should not be too heavily relied upon by Kolb as support for work.

> "...these systems are major forces in determining a holistic pattern of psychological and physiological processes that govern the person's orientation towards action or reflection" (Kolb, 1984, pg. 57).

Summary of Knowledge and Transformation.

For Kolb there are two basic processes which occur within learning, the grasping of the experience and the transformation of the experience, with the result of establishing meaning. Kolb presents each of the two processes in opposing dialectic pairs. He describes these dialectic pairs as being,

> "Dialectic oppositions between two independent but mutually enhancing orientation" (Kolb, 1984, pg. 59).

The grasping of experience is broken down into:

- Apprehension, the direct experience of the concrete world.
- Comprehension which is the symbolic representation of the known experience.

Either of these experiences can then be transformed into meaningful learning via:

- Extension - which is the physical implementation of an experience.
- Intention - which is the cognitive reflection on an experience.

Hence for Kolb learning can occur in one of four main ways:

- Apprehension via extension
- Apprehension via intention
- Comprehension via intention
- Comprehension via extension

CHAPTER THREE : ESTABLISHING A LEARNING STYLE

Establishing a learning style.

> "Stable and enduring patterns of human individuality arise from consistent patterns of transaction between the individual and his or here environment". (Kolb, 1984, pg 63.)

Within his conception of learning styles Kolb attempts to create a balance between the individuality of each learner (and therefore the freedom learners notionally have to engage with the learning environment as they wish) and the belief that learners establish a dominant mode of operation that characterises their learning. One of the major reason Kolb wishes to distance himself from a too prescriptive interpretation of learning styles is to maintain the complexity that exists within the learning act. A diverse and involved task that is best viewed as such.

> "Psychological categorisation of people such as those depicted in 'psychological types' can too easily become stereotypes that tend to trivialise human complexity". (Kolb, 1984, pg 63.)

The complexity of learning for Kolb was one of its inherent qualities and all learning should be understood in light of this. The root of the complexity is the two major factors involved within learning, that is, the individual and the environment both of which are infinitely variable; and their combination compounds any complexity. Kolb recognised the complexity of the context of learning by shifting his underlying epistemology away from 'formism'; the scientific approach most readily associated with the categorisation of types, and instead exploits' contextualism. Thus Kolb is able to distance his theory from the notion that there is an ideal form of each type and each individual is an imperfect representation of this type; for such an epistemological position would question the value of experience within learning theory. If there are ideal types, these exist objectively outside the individual, their experience neither creates the ideal or impacts on it. However, contextualism brings the role of experience centre stage,

for the learning is viewed in the light of the ever emerging history of the learner. This places an emphasis on the personal creation of learning styles rather than the attribution of learning styles based on an ideal that is independent of the learner.

If this active and flexible approach towards learning style is adopted it has to be in some way regulated by a degree of stability, for if the learning styles were completely free to vary then their identification would be of questionable value, as they would always be in a state of flux. Therefore, knowing a learning style of a person would be of little value as it may have already changed. The learning styles are established at the interface between the learner and the learning environment. It is here that stability in approach is believed by Kolb to develop via regular patterns of interaction. Kolb exploits the work of Tyler (1978), to explain how the patterns of interaction develop. Tyler worked with what she called 'possibility processing structures', these basically were ways in which a person selected the perceptions and activities within learning, which in time characterise their approach to learning. There is always choice available for any learner, the sensory information available to them is always in excess of what they can process into perceptual understanding. Hence the learner must always select information to attend to. This selection procedure according to Tyler, is the result of a 'programming'. The majority of the programming, according to Tyler, is standard to all people and cultures, this eases day to day existence. Some of the learning style programming however, is as the result of particular characteristics of an individual and in many ways is source of their individuality. The 'personal programming' is not shaped purely by the individual's choices with learning, but also as a consequence of those choices. These consequences in turn impact on future personal choices within learning. Kolb perceives that this processes to be central to his theory of learning.

> "The way we processes the possibilities of each new emerging event determines the range of choices and decisions we see. The choices and decisions we make, to some extent, determine the events we live through, and these event influence our future choices." (Kolb, 1984, pg 64.)

The logical conclusion of such processing is the establishment of particular ways of perceiving the learning environment and specific ways of interacting with the learning environment. These specific ways of interacting with the learning environment are the foundations for Kolb's learning styles. Each learning style is the consequence of a sequence of choices within the learning environment, resulting in a 'self-programmed' learning style based on the emphasis on apprehension and compression; intention and extension.

Development of learning styles - The triumvirate.

Kolb cites a number of factors that are important to the development of learning styles. These range from genetic factors or what Kolb labels to as 'hereditary equipment', to the demands of the specific learning environment in which the learner is operating[11]. These factors all impact on the development of the learners' own style of learning. They have varying levels of inherent stability. The influence of genetic inheritance is completely stable, in that its influence can not alter over time. If a student has an inherited preference for approaching learning in a specific way, be that actively or reflectively; this influence is predominantly not open to any form of change. If this were the only factor in the establishment of learning styles then they could not change over time. However, the two other factors are important; for each add the possibility of change within a learner's approaches to learning. The 'past history' has intermediate stability. The stability is derived from the fact that the influence of past history is as a consequence of a whole series of learning events. Hence a single different learning event will not change the learning history dramatically. However, if the next learning event replicates the change and so does the next, the learning history will change and so to will its influence on learning. Past history therefore will have the effect of

[11] Although Kolb places great weight on these three factors in the development of learning styles he prevents no empirical evidence for their effect. The effect of factors such as 'hereditary equipment' would be exceptionally difficult to demonstrate within a Popperain notion of scientific evidence. Finally it is difficult to perceive how knowledge of this triumvirate adds to the practical understanding of learning. These arguments are further discussed in chapter nine.

stopping any immediate change, but is open to change if its influence occurs over a longer period of time. It can be thought of as a regulator that resist change but will not stop change occurring. Rubin (1981) noted that learners tend to shift to introversion but retain their position within the population as a whole relative to their peers. The final and most volatile influence on learning is the specific learning environment in which the learner finds themselves. The demands of this environment are immediate and varied. If any learner is going to be effective in more that a specific environment, they are going to have to be able to meet the challenges of various learning environments. A learner may have to apply themselves to learning in a manner that is completely contradictory to their normal learning style. The effect of the learning environment is therefore immediate and lasts as long as the student stays within that environment. The immediate learning environment does however, impact on the learning history that may, depending on other learning experiences, impact on the learning styles. Kolb accounts within his theory for both stability and change in his learning styles; he perceives learning styles as stable ways in which students engage with learning (what is difficult here is that Kolb makes no attempt to define exactly what he means by 'stable', that is whether the stability to which he refers is absolute or relative, and if, as suspected, it is relative stability exactly what time scale is the stability based upon).

Sources of stability and change in Kolb's learning styles.

- Heredity - establishes predisposition to approaching learning in a specific way, not open to change.
- Personal history - learning experience shapes the way in which the pre-dispositions of a learner are exploited and other strategies are developed. The fact that its influence is based upon an established history means change is resisted, but can occur over time.

- Immediate Environment - makes specific demands on learner based on the nature of the environment. These are exceptionally volatile demands and require constant adaptation from the learner.

Flexibility and learning style

It has already been noted that the environment impacts on how learning is approached. Different environments place different demands upon the learner; this has the effect of developing a learning history that emphasises certain approaches to learning. This in turn impacts on how future learning will be approached. In short what is established is a positive feedback loop, the more we do a thing, the more likely we are to do it. This characterises the development of learning styles.

Kolb recognised that early learning is broad and not narrowly topic focused, this is because much of the time is spent learning basic skills that will be used to investigate more specialised subjects. Kolb argues that this learning stage tends not to produce distinct learning styles (above and beyond the inherited pre-dispositions). By the time secondary school is reached specialised programmes of education are being embarked upon, a science emphasis or an arts emphasis to a programme will create a different positive feedback loop; although Kolb does not overtly make a simple connection between specific learning styles and arts, humanities and sciences. Thus establishing a specific way of approaching learning that most likely will be reflected in a different learning style. The effect of secondary school is compounded for students who go on to further and higher education by more specialisation, which in turn should be reflected by greater exploitation of a learning style. Kolb takes the effect of learning environment to be such that

"...we would expect to see relations between people learning styles and the early training they received in an educational speciality or discipline". (Kolb, 1984, pg 85.)

What is being argued here is that specific learning styles will be associated with specific disciplines. Kolb attempted to demonstrate this point by plotting the LSI scores of post graduate managers against their undergraduate degree course. If Kolb's predictions were correct different degree course would be associated with different learning styles. When the LSI scores were plotted the following associations were noted.

Degree course.	Associated Learning style.
Engineers	Converger
Business studies	Accommodator
History, English, Political science, Psychology	Divergent
Mathematics, economics, sociology and chemistry	Assimilator
Physics	Strongly abstract but AE-RO score is equivalent to the mean hence they fall in the lower half of the plot between assimilator and convergers.
Foreign Languages	Strongly reflective but AC-CE score is equivalent to the mean, hence they fall on the right side of the plot between divergers and assimilators.

Table 3.1 The connections Kolb made between specific learning styles and degree courses.

It must be noted that the group was norm referenced against itself, in order to divide it into the four quadrants. The abstract conceptualisation - concrete experience dimension mean score was +4.5 placing the mean towards the more abstract end of dimension. The active experimentation - reflective observation mean was +2.9, placing the mean towards the active end of the dimension. Overall, therefore the group was convergent in approach. This means that any notion of absolute learning styles has been jettisoned in favour of relative learning styles. For example mathematicians are more assimilative than engineers, who are more convergent. However, overall they both express a convergent approach to

learning. This may be a product of the fact that the group is made up purely of graduates who want to become managers (although the role of managers can be wide). However, after noting the overall bias within the group, there are still thematic differences between the disciplines. Indicating that the emphasis of the undergraduate course has shaped the learning styles of the students. That the demands of nursing are such that they established a *best method* of 'converger', this does not mean that all nursing tasks are convergent but rather that overall this is the most appropriate learning style for nursing.

Foreign language and physics demonstrate that occasionally learning styles of students fall between learning styles and fail to exhibit the properties of a single style. These situations establish combination styles, which have properties of two learning styles. Theoretically it would be possible for a person or group to fall at the very mid point of the plot between all four learning styles, this perhaps could be viewed as a perfect all round approach or Jung's perfect adaptation (if the group is norm referenced to itself, this perfect adaptation would be relative to the rest of the population) but although theoretically possible this situation should be recognised as exceptionally rare, as it would have to be the product of an inherent predisposition that values no one approach more than any of the others. Also such a central learning style would require a learning history that did not place an emphasis on any single learning style and exploited all four equally; such a situation, unless actively, sought would be exceptionally rare if not impossible.

The early work of Hudson (1966) working with convergent and divergent approaches to learning noted that arts students tends to exhibit an approach that emphasised a divergent approach, whereas physical science students tends to show convergent learning styles in general. Hence the arts students were concrete and reflective, science students active and abstract. This demonstrates the precedent that different disciplines approach learning in distinct ways, although Hudson's classification may not neatly map onto Kolb's the basic principle that approaches to learning is thematically different is established. It is worth noting that neither Hudson or Kolb expressed clearly the causes of these differences. If the three

main factors in the establishment of learning styles are returned to, it is difficult to determine whether the differences are as a results of students with certain pre-dispositions being attracted to specific degree courses or whether the effect of being on a specific course establishes a learning history which shapes a learner to behave according to a given learning style. Of course it could also be a dynamic interplay between the two. Rather than address this issues both Hudson and Kolb accept that learners in specific areas have different approaches to learning and do not problematic the source of this difference. Kolb noted that there were other differences between discipline that reflected fundamental differences in students approaches to the learning environment, vocational courses were attended to in a less reflective way than non-vocational courses. This is supported by the argument that vocational courses are more active in their orientation and less abstract, resulting in a reduction in the amount of reflection. The same basic relationship that exists between the college degree courses and the learning style of associated professions. That is, as the student moves from college into the world of work the learning environment will change from the highly reflective nature of degree courses and shift it into a more active orientation. Kolb presents two plots, one of student degree courses (1984, pg 86, figure 4.4) and one for professional groups (1984, pg 89, figure 4.5). From these two plots it can be seen that the group mean score for active experimentation - reflective observation is 2.9 for students and 3 for professional groups (If it is presumed that the grid lines represent the mean in figure 4.5 as they do in 4.4[12]). Indicating little shift in emphasis between the two groups. Kolb's statement "The transition from education to work involves for many a transition from reflective learning orientation to an active one", is not supported by the data presented within the two plots. There is however, quite a dramatic shift on the abstract conceptualisation - concrete experience dimension. The group mean for students is 4.5, compared to the professional norm of 3. This

[12] It must be noted that from the data presented on plot 4.5 the line which is taken to be the mean AE-RO score cannot in fact be the mean. This because all but one profession fall on the active side of the line and the one profession which does not, only just tips over into the reflector side. However, there is no information presented to explain these anomalies or any information given as to what else the line could represent e.g. the mean of a large body of professions. However, the line is taken to be the mean of the group in order to aid discussion. (This is further discussed pg 232 - 253.)

indicates that there has been a shift to a greater emphasis of abstract approaches to learning by the professional group. The students approach learning in a more concrete manner, although overall the students still emphasise an abstract approach. When discussing the cognitive move from study to work Kolb only discusses the active-reflective dimension. It would seem reasonable to argue however, on the abstract- concrete dimension, that the world of work is more closely associated with the concrete end, perhaps due to the task orientated nature of work. The data presented by Kolb run counter to this intuitive position. It is worth noting that due to the way in which Kolb presents his data it is impossible to discern if the difference between students and professionals in the active-reflective dimension is significant.

If the actual distribution of professions is looked at on the plot of professions learning styles, the vast majority of profession presented fall in the Accommodator section, with its emphasis on concrete and active approaches to learning. This appears to fit neatly with how a profession would be intuitively perceived. It is worth noting however, that the approach is only *relatively* accommodative and that overall all presented professions, bar elementary education, fall toward the abstract end on the dimension. The active orientation is fairly strong however, with all groups, bar social work, scoring above +3 towards the active end of the dimension. It could be argued that overall the professions presented are active and abstract meaning they would fall in to the category of converger learning style. In Kolb's defence it could be argued that skewing of the results towards the converger approach to learning could be as a result of the sample of professions being heavily oriented to the 'caring professions'.
Professions represented:

Nursing	Medical technologist	Accounting
Social work.	Medicine	Engineering
Physical therapy	Elementary education	Management
Dieticians	Secondary education	Agricultural extension
Occupational therapy	Educational administration	-

From the above list it can be seen that seven of the fourteen professions represented are in the caring professions. Of the remainder a further three are in education related areas. This distribution of professions is not discussed by Kolb. It is not in any way representative, and may be the source of the overall skewing of the learning styles towards a convergent style. Within the research undertaken here for example, nursing students are used to represent the converger learning style. Hence the nursing profession and related areas of medical practice may have had the effect of shifting the emphasis to the convergent approach. However, it must be noted that it is not the caring professions that are found to be the *most extreme* abstract and active learners. Accounting and engineering are more extremely abstract than all caring related professions bar medicine. Thus the source of any skews in the results is not simply as a product of caring profession being more abstract in their approach.

What can be concluded from this information is that professional groups have different approaches to learning and exploit the learning environment in various ways. From what Kolb presents there does not appear to be a simple general formula that can be applied to professions to estimate what approach to learning they will have. In fact from the professions he presents there is an overall abstract emphasis to learning, which perhaps runs counter to many concrete tasks involved in job performance, such as the physical manipulations involved in physical therapy. Kolb does present an explanation as to why the assignments of professions to learning styles may be difficult; 'Some of the variation can be accounted for by the professional's specific role'(1984, pg 90). Thus Kolb is arguing that, for example, all nurses are not *created* equal; and specific tasks result in nurses or any profession emphasising different approaches to learning.

In stating that the specific task is shaping the learning style of any given professional Kolb is placing considerable emphasis on immediate learning environment, compared to predisposition and learning history. It has to be recognised that specific task may have what could be called a 'micro history' associated with it, due to the implementation of the job role, hence a degree of

stability. However, Kolb is implicitly recognising that the learner has the ability to shape themselves to the task, which may be contrary to the dominant learning style and learning history of the professional group. Kolb's work with 100 managers noted that their relative learning styles altered depending on the area of their management. The managers which Kolb studied all worked for the same American mid western company. Relative to the group as a whole marketing managers were accommodative, personnel managers were divergent, research managers were assimilative and engineering managers were convergent. Finance managers fell between assimilative and convergent styles. Thus learning styles seem able to distinguish between the specific role and the generic group of 'managers'. Kolb supports this position by citing the research by Plovnick (1975), who was able to distinguish between the learning style of medical students depending on their specialisation within medicine. Family practice was associated with Accommodators; Psychiatry was associated with divergers; Academic medicine and pathology with assimilator and general medical specialities with convergers. Thus the immediate environment seems to have a direct impact on the learning styles and causes a shift in approach[13].

If specific role of within a group effects the approach of the professional carrying out that role change will occur. Change must be as a result of the specific tasks of that role. Hence the final and most immediate factor in the shaping of learning style is the specific task. Kolb referred to this immediate interaction as adaptive competencies. These competencies are related to the learning styles of a student.

[13] The work of Plovnick does not exclude the possibility that job choice or choice of specialisation was *caused by* learning style as a personality trait. Indeed, as the Plovnick's findings are purely correlational in nature it is impossible to determine from they any direction of causality. All this combines to cast serious doubt on Kolb's use of this work to support his own.

Learning Style	Associated learning skills
Accommodator	Acting skills - setting objectives, exploiting opportunities, leading, getting involved and dealing with people
Diverger	Valuing skills - sensitive to values and people, being open minded, gathering information and clarifying ambiguity.
Assimilator	Thinking competencies - organising information, building conceptual models, theories and ideas testing, designing experiments and analysing quantitative data
Converger	Decision skills - establishing new ways of thinking and doing, problem solving, setting goals and decision making.

Table 3.2 The connections Kolb established between learning style and learning Skill.

Effectively it is the adaptive competencies that facilitate the change necessary to deal with ever changing immediate environment faced by learners.

Although Kolb has recognised the influence of the immediate environment and notes that this can have the effect of shifting a learner's approach to the learning environment, these effects are limited to the person's original learning style. That is the adaptive competencies are not independent of learning styles. If they were adaptive competencies they would be free to change a learner's approach in any manner. However, Kolb links the adaptive competencies directly to learning styles. Hence Convergers have characteristic adaptive competencies that will effect their approach to the immediate task in hand in ways that are specific to convergers. The same is true for all learning styles. This dramatically limits the possible shift in approach that is available to any learning style. Learning styles in light of this information are not free to radically change but rather shift emphasis within a learning style. From the descriptions of the learning competencies, it has to be noted that they strongly echo the main characteristics of the associated learning style. The converger learning style group for example have competency skills that focus on problem solving and decision making, features which also characterise the learning style of converger. The notion that the adaptive competencies will facilitate change or development in a learning style must be moderated with the knowledge they will do this in a manner that is characteristic to the associated learning style not free of connections with learning styles.

Kolb appears to have recognised this anomaly within his theory by developing another inventory that described learning skills. Kolb describes the differences between the two as follows:

> "Learning styles describe basic and generalised dimensions of individuality in learning, while a learning skill is more situational and subject to intentional development". (Boyatzis and Kolb, 1991, pg 279.)

The adoption of learning skills appear to be associated with Kolb presenting a greater degree of flexibility for the learner within the immediate learning environment. Kolb is not trying to replace learning styles with learning skills, but rather compliment the global learning styles with specific learning skills. The learning skills however, were not left as free standing abilities, they were linked back to learning modes[14] and implicitly the associated learning styles. Although this appears to be a logical association, it does have the same limiting effect that was imposed on adaptive competencies. That is, although Kolb facilitated a greater degree of freedom in dealing with the immediate environment this was limited to the original learning style. The skills were characteristic of a given style or mode (see table below).

Learning skills	Correlated learning mode.
Leadership, relationship and help skills	Concrete experience
Information analysis, theory and qualitative skills	Abstract conceptualisation.
Action, initiative and leadership skills	Active experimentation
Information analysis skills	Reflective observation

Table 3.3 The connections Kolb and Boyatzis established between learning skill and learning mode. After Boyatzis and Kolb 1991, pg 258.

This leaves learning styles as the characterising feature of any learner; any variation that occurs due to learning skills does not extend outside the confines of a given specific learning style. Due to the confines placed around learning skills

[14] See chapter two for detailed explanation of learning modes.

they can be used to reinforce the argument that learning styles are traits, and are another factor that can be added to the sources of stability of learning styles.

From the original three main factors which influence the development of learning styles, it has been established that the immediate environment, once a learning style has been established, does not radically alter a learner approach as it is essentially how that learning style is in fact implemented, rather than an independent set of strategies which may contradict the dominant learning style. Learning skills for example can be thought of as if they were a subset of learning styles not an independent group. It would appear therefore that learning styles set up a positive feedback loop, where the use of a learning style facilitates further use of that approach. Hence flexibility in approach would be greatest during a learner's formative years before a strong positive feedback loop has been established. In turn once a strong feedback loop has been established any change in approach to learning will be resisted. However, it must be clearly and categorically stated that this resistance to change should not be interpreted as meaning change of learning style is impossible, change can occur but as a result of long term development rather than instant shifts. Boyatzis and Kolb's (1991) presentation of learning style does not act to increase the possibility of change within approach to learning but rather characterises the approaches of the various learning styles.

The enduring image of learning styles therefore, is one of a characteristic approach to learning which is relatively stable across time and is most likely to shift emphasis rather than radically change to meet the demands of a specific task. It would seem reasonable to conclude therefore that learning styles exhibit a high degree of stability most closely associated with traits; this stability is reflected by the inherited predisposition, learning history and the learning skills of a learner. Even the immediate environment that will vary in the demands it places on the learner cannot simply be perceived as evidence for flexibility. How the learning environment is processed is dependant on the stable inherited predisposition, learning history and skills, all factors that will increase the likelihood of the

immediate environment being interpreted in accordance with the original learning style of the learner.

Design considerations for the learning style inventory.

When designing the LSI Kolb had a number of specific design criteria in mind. One important issue for Kolb was that the test should encapsulate the same learning dilemmas that exist within the 'real' learning environment. The demands should be appropriate for the application of their standard possibility processing structures. This will allow the learners to respond to the test in the same way as they respond to actual learning. Secondly it was important that the result of the test would allow comparison both between students, that is a normative test, and also between individuals' learning mode scores, that is an ipsative test. The test was designed to be self-descriptive to further facilitate the application of possibility processing to structures already developed within the learner. Kolb also believed that if the test was going to be generally used outside the research interest, it should be brief and straightforward. This hopefully would mean that it was open to use by a broader cross section of people, who might be interested in studying learning. All these considerations are reflected in the final design of the LSI, which in many ways is idiosyncratic compared to other tests that measure cognitive or learning style, such as Honey and Munford (1986, 1992) test or Cranfield and Cranfield (1976) .

The version of the LSI used in this research (Kolb,1985) (there are two earlier versions that have been refined and slimmed down) uses nine self description items, on a single short questionnaire. Each item contains four words each of which correspond with one of the four learning modes. The respondent is then asked to rank-order the words from one to four so that they represent their approach to learning. The word ranked as one most closely representing their approach, the word ranked as four is least like their approach to learning.

E.G.

___Intense ___ Reserved ___ Rational ___ Responsible

In this example (item 8 from the inventory) the learning modes are represented as follows:

Learning Inventory Style Word	Associated Learning Mode
Intense	Concrete Experience
Reserved	Reflective Observation
Rational	Abstract Conceptualisation
Responsible	Active Experimentation

Table 3.4 The relationships between example learning style inventory words and leaning modes.

From each item on the scale six scores are generated, one for each of the four learning modes and two combination scores, one to measure how the respondent stresses abstractness over concreteness (AC - CE scores) and the extent to which the person emphasises action over reflection (AE - RO scores). This together with the scores from the other eight items on the inventory produces the information on which the learning styles are established. This information can be represented in a number of ways, the dominant two ways being the assignment to a learning style and the learning style profile.

The learning style profile.

The learning style profile is generated by plotting each of the four learning mode scores on a set of axes; these points are then joined together to create a kite shape. This represents the respondents' specific approach to learning, showing how much they emphasise each learning mode and its relationship with the other three learning modes. These profiles are generally used to gain personal insight into ones own learning style or to be able to discuss ones approach with a tutor or college. The learning style profile is not used within this study, as this detailed personal information was not relevant. The learning styles, that can also be generated, were used in place of the learning style profiles.

Generation of final learning styles from the LSI data.

The two combination learning mode scores are used to place the participant in one of the four quadrants a set of axes. The combination scores are established by taking one of the dialectic pair from the other, for example abstract conceptualisation would be taken from concrete experience, if the result were positive the learner emphasises abstract conceptualisation more, if negative they emphasise concrete experience more. The same is done for the active experimentation and reflective observation pairing. These two combination scores are then plotted on the axes, AC-CE in the horizontal plane, AE-RO in the vertical plane. A point will then be plotted in one of the four quadrants; the quadrant in which the point is found reflects the participants learning style.

Dialectic Pairs and learning modes.

In order for the learning styles to be established combination scores have to be used. These are created on the assumption that the dialectic pairings are in fact unitary and a high score in one equates with a low score in another. The validity of this assumption has to be tested because only two of the learning modes are expressed in the eventual learning style at the expense of the other two learning modes; it is important therefore to establish the exact relations within the dialectic pair. Kolb presents his position on the relationship as follows:

> "We have emphasised that these dimensions are not unitary theoretically, such that a high score on one orientation would automatically imply a low score on the other, but rather that they are dialectically opposed, implying a higher order synthesis on opposing orientations makes highly developed strengths in opposing orientations possible." (Kolb, 1984, pg 74)

While recognising the possibility of high scores in both orientations Kolb is clearly forwarding the notion that the combination scores do reflect the students

general approach to the learning environment. Kolb (1976) demonstrated that CE-AC were negatively correlated (-0.57 $p< 0.001$) and AE-RO were also negatively correlated (-0.50 $p< 0.01$). This is far from a perfect negative correlation but it does establish a trend that implies that a high score at one end of a dialectic pair is most likely to occur together with a low score on the other. Considering these results Kolb established the combination scores, aware that information was being lost but believing that the final score approximately represented the participants overall orientation within learning.

Kolb does not attempt to establish a link between the two learning dimension; the scores on one dimension do not relate to the scores on the other. The independence of the two dimensions was demonstrated by Mentkowski and Strait (1983). During their longitudinal study the concrete/abstract dimension varied in the way that would be predicted by Perry (1970) and Kohlberg (1969), that is a shift from concrete to abstract. The active / reflective dimension did not follow a similar course of variation; no form of development or change was noted over the length of the study. This demonstrates that the two dimensions are not impacting on each other and the change in the concrete/abstract dimension is independent of the reflective/active dimension. Kolb perceives such research as providing support for his claim that the two dimensions are in fact independent.

One possible criticism of Kolb is that any forced choice format will have an inherent negative correlation between elements. Certo and Lamb (1979), however, showed that the negative correlation still existed between Kolb's two dimensions even after the forced choice format had been accounted for. They demonstrated this by generating 1000 random responses to the forced choice format. If these results are used to establish a new zero point rather than an absolute zero point, the relationships between the learning mode scores can be investigated with the effect of forced choice format being partialed out. The results of the study demonstrated that the negative correlation between AC-AE and AE-RO were significantly stronger than the randomly produced negative correlation that is

inherent within any forced choice format. This indicates that the negative correlation was more than a manifestation of the forced choice format.

Considering this information Kolb establishes his position on the relationship between the dialectic pairs of learning modes within each of the dimensions.

> "If for the purposes of analysis we treat the abstract - concrete and active - reflective dimensions as negatively related in a unidimensional sense, it is possible to create a two - dimensional map of the learning space that can be used to empirically characterise differences in the four elementary forms of knowing. (Kolb, 1984, pg 76.)

For the creation of his learning styles Kolb perceives each of the two dimensions as unitary and the learning modes within each dimension as negatively correlated. Although Kolb does note that this is done for the purposes of analysis it has to be recognised that as far as the establishment of learning styles are concerned the dimensions are in fact unitary. At no point during the establishment of the learning styles are the dimensions treated as anything other than unitary. In fact the learning styles could not be established if the dimensions were not treated as negatively correlated, as the combination scores used to plot the learning styles could not be generated. Kolb refers to the adoption of this pragmatic standpoint on the relationship between learning modes and the establishment of learning styles as an 'analytic heuristic'. (A useful but not deeply grounded model for the purpose of analysis.) This heuristic, Kolb argues, is a consequence of a number of factors in any students personal history. Over time any student will adopt specific ways of resolving the tensions between prehension and transformation, how prehensions and transformations are exploited characterise learning styles. It is a heuristic and not a law because students can change their approach.

Final summary of Kolb's position.

Kolb presents a dynamic theory of learning, which is based on the interaction of the learner with the environment. This interaction is tension filled due to the different ways in which the learning conflicts can be resolved. The conflicts are caused by the fact that knowledge, according to Kolb, is created by the learners' interaction with the environment; knowledge is not simply observed or theoretically established. This interaction establishes two main sources of tension; how the experience is attended to, that is via apprehension or comprehension, and how the experience is transformed into meaningful learning, that is via extension or intention. These tensions and different ways in which a learner can resolve them are the sources of Kolb for learning styles Converger (comprehension and extension), Assimilator (comprehension and intention), Diverger (apprehension and intention) and Accommodator (apprehension and extension).

In order to demonstrate that his learning styles draw on recognised psychological characteristics and contain more than face validity, Kolb links his work with the 'epistemological' distinctions that exist within Jung's psychological types. This grounds his work in what he takes to be an area of strong psychological research. Considering this support Kolb felt justified in distinguishing among the four learning styles and argues they represent fundamentally different ways in which the learning environment can be approached.

Whilst recognising that his learning styles represent stable ways in which a learner interacts with the learning environment, Kolb also indicates how the learning styles can change over time. Three factors influence how learning styles are developed, heredity, personal history and immediate environment. Heredity is completely stable, immediate environment infinitely variable, and personal history acts as a stabilising factor between the two. If an immediate environment occurs frequently enough it will alter the personal history and the way in which that learner approaches learning. A single incident however, will not have the

effect of changing the learning style, as there will be no significant change in the learners personal history.

In order to assess learners' styles of learning, Kolb developed the learning style inventory, a short nine item inventory. Each of the nine items requires the learner to rank order four words that represent Kolb's four modes of learning. Depending on how the learners rank the words establishes their learning style. The inventory was designed so that it represented the learning conflicts that are faced within all learning environments and that it could be administered quickly and easily.

In short Kolb established four main styles of learning which represent different ways in which a person can resolve the conflicts within learning. A learner has a single dominant learning style that is relatively stable over time and will characterise their approach to learning, but is open to change.

CHAPTER FOUR : METHODOLOGY FOR STUDY.

Ontological and Epistemological perspectives.

The following list of statements gives an insight into the epistemological and ontological priorities of this study.

- No one lecture is the same for any two students, the differences between the two students' experiences are important.
- Students' understanding of lectures will be different to that of lecturers.
- Students' opinions concerning lectures give a valid insight into the lecture format.

For this study the students are more than a subject; as they are expected to do more than respond to experimenter designed questions. The students play an active role in the design of the experimental lectures and their opinions (contradictory as well as confirming opinions) are valued within the study. For these reasons the students are viewed as participants. Due to the fact that one of the ontological priorities of this study is that students have varied and personal opinions of lectures, which will differ from those of lecturers/experimenters, the use of student perceptions as part of the data of this study would appear logical. As student perceptions reflect the varied perspectives that are possible of any one lecture, their use supports the ontological position that there are no objective will be a range of student perceptions. The methodologies that are developed therefore will have to accommodate these ontological and epistemological priorities.

The valuing of the participants' opinions within a study is not original to this study and it taps into phenomenological approach to research. There is a certain amount of tension within phenomenological thought about exactly what constitutes phenomenological approach, there is however, a large area of consensus that was outlined by Curtis in his discussion of education and phenomenology (1978).

1. A belief in the importance, and in a sense the primacy, of the *subjective consciousness.*

2. An understanding of consciousness as active and *meaning bestowing.*

3. A claim that there are certain essential structures to consciousness of which we can gain direct knowledge by a certain kind of reflection. (Exactly what these structures are is a point about which phenomenologists differed.)

As Curtis stated "each [of the above statements] enable us to see important implications for education. If a 'true' knowledge of the education from this perspective is to be gained we must look at the subjective experience that surrounds the whole area of education. Adopting a stance that does place emphasis on subjective consciousness. A subjective consciousness that is ideally illustrated by personal perception, a process which has to be both subjective and bound within an individuals consciousness." (pg 78) Thus suggesting phenomenology would be a positive way of gaining an insight into the students' perceptions.

The stages of the study.

The collection of data for this study was broken down into three main sections, each with relatively discrete aims. The sections are presented in the table below.

	Aim of each stage.
Stage one - **Good and bad features of lectures.**	Student generated information that could be used to catalyse focus groups if necessary.
Stage two - **Focus groups on lectures**	Student generated information that would aid the design of the experimental lectures.
Stage three - **Experimental lectures**	Gain information concerning the attunement of learning styles and lectures.

Table 4.1 The three main stages of the study undertaken.

The desire to incorporate students' opinion into the study is exhibited within all three stages of the study. The first two stages of the research allow the students' opinions to shape and to be incorporated into the design of the experimental lectures[15]. It would have been possible to design the lectures purely from the literature and information from lecturers; this however, would render the student as passive within the study's environment. In order to remain focused on the original priorities of this study it was decided that students needed to have a central role in the attuning of the lectures to learning styles. Being aware of what the students understood lectures to be, would allow the design to be attuned to their understanding, as well as the theoretical understanding within the literature.

[15] The focus group research method has been criticised as leading the students towards conformity and so not representing a 'pure' account of the individuals perceptions. However, the focus groups used with this study were designed so the final responses given by the students were done individually and anonymously. Hence the focus groups were able to 'feed' the students' ideas, but ultimately the students were free to comment as they wished. See methodology section for more details of focus group design.

Perception Vs Objective measures.

The focus on the opinions went beyond the actual design of the study that was to be implemented but also shaped the data that was collected from the students as well. The questionnaires used in stage three, were based on student perceptions of how well they had learnt. There were no 'objective' measures of how well the students had learnt; there were a number of reasons for this.

- Due to the fact that the study was carried out using real lecture courses frequently students had other commitments after the experimental lectures, hence administering a test was not possible. If the test was administered at a later date the research could not be sure if the results were as a product of the lecture or some later learning.

- If it had been possible to administer the test immediately after the lecture no time will have been allowed for reflection, something which Kolb argues is an integral part of the learning process.

- If the attunement of learning style to lectures is accepted, then it would seem reasonable to extend this attunement of learning styles to assessment, leading to the conclusion that different forms of assessment would be necessary. However, clear, universally accepted information concerning the assessment and learning style attunement is not available causing any claim of attunement to be speculative. It would be difficult therefore to conclude whether any differences in performance were due to different amounts of learning within the lecture, how well the student responded to the test or a combination of the two.

- If the above problems of attunement and learning styles could be addressed it would then be necessary to decided what test score represented 'good learning'. Would these differ depending on individual ability or would a standard cut off point be made between different standards of learning. Both

approaches to deciding what 'good learning' was, would be highly problematic.

There are clearly serious problems to be faced when trying to test students' learning in the experimental lectures. It is not the case that the performance can be quickly and simply assessed using an objective measure. It was felt that the addition of a learning test would introduce a whole new array of variable, which could impact on the results gained from the study. For example from a 'poor' test score it would be impossible to tell whether the score reflected poor learning within the lecture or poor performance on the test. For these reasons it was decided that any attempt to measure learning via a test would be dropped from the experimental design and assessment of learning be based on students' perception of learning. It should also be noted that use of a test instead of student perception would also go against the ontological priorities of this study, as a test implies there is an universal objective measure of learning within lectures and this study places emphasis on recognising the diverse range of possible learning that exists within a lecture.

Drawing on the phenomenological position does however, being with it problems that need to be recognised and addressed.

- Do students really know how well they have learnt within a lecture? Students are rarely asked how well they have learnt within lectures and so their rating may not be very reliable.

- Accepting that a student is able to rate their learning within lectures, what does a positive and negative perception of learning actually mean; is one student's positive rating comparable with the next student's positive rating?

The first point is only really a problem for those working outside the ontological priorities used here. As this study is emphasising and valuing the perceptions of the students taking part in the study, it is implicit that they will be able to express

their perceptions effectively. The students however, by the time it comes to answering the questionnaires will have taken part in a focus group concerning lectures (see below for details) which will allow the student to engage with group discussion about lectures before being asked to comment personally. The group discussion will allow the student to actively bring to mind what features facilitate and inhibit their learning, before having to comment independently on the questionnaires. The rationale behind this was that students may find it difficult to instantly articulate their opinions and the time to reflect would allow them to develop their opinions so their perceptions can be effectively expressed. The notion of comparability of perceptions is one that skews the use of perceptions back round to more objective measures. The use of perception was to allow students to rate the lectures based on their own personal criteria, hence a lecture can be rated as good by two students for completely different reasons, but what is centrally important to this study is that the lecture was perceived positively. Information from the open questions will hopefully give insights into any differences in why the students rated it positively and these will be used to shape further lectures but it still remains centrally important whether the students rated it a poor or positive and this is comparable.

Use of Student Evaluations.

Student evaluations of academic courses have been rising in popularity since the 1970's especially within the American system (Doyle, 1983). Student evaluations in the United States regularly form an important part of course evaluations, to the extent that funding of the course and staff advancement is based upon the results of such evaluations. However, is such faith in the students' ability to evaluate and accurately report academic courses well founded; are students' views not fickle, open to easy manipulation and most of all naive?

Ramsden (1991) clearly perceived that students were a useful source of information.

"... because students see a great deal of teaching, they are in an unrivalled position to comment on its quality" (pg 131).

Students are the regular user of lectures it does not seem unreasonable therefore that they should be able to comment upon it. Yet such a position does not address the issue that the students' comments could be naive, just because students' experience education does not make them educationalists. Students need not and probably would not have any theoretical insight into the teaching, hence the information gained can only be presented as relevant only to the surface features of the teaching and therefore of little true value. Such a view however, is exceptionally limited and presents students as being sources of information that is effectively 'watered down' educationalist insights. If the information gained from students is re-framed it value is drastically increased. It is correct to think that students' comments from an educationalist perspective will be limited, however, as the non-expert recipient the student is in an unrivalled position to provide the system with information. It is the student who is at the receiving end of the teaching and it is they who can comment on the practice and implementation of any teaching system. At this the evaluations of students rise in importance above and beyond that of researchers and educationalists; free of theoretical underpinnings and academic political agendas the students can comment on the teaching that emerges from any course. This re-framing of the students' position within the equation within academic research is reflected in the work of Remmers (1928) who is presented as being the modern father of student evaluation. Remmers presents three requirements that must be fulfilled within any student evaluation. The point that is relevant here is that the students must only be asked to comment upon what is open to their observation and judgement. Asking students to inform research about educational theory would therefore be highly dubious, but to ask them to comment on the practice and their reaction to it would be perfectly valid.

It appears that a strong case can be made to support the use of student evaluations as they are in the privileged position to be able to comment upon the actual educational experience. This however, only addresses the issue of where to focus the questioning of student evaluations; and to an extent may even compound the issue that students' comments may be open to irrelevant factors, as students seem best able to comment on the immediate surface features of teaching. The initial Dr Fox research and that which followed has addressed itself to this issue. Naftulin et al (1973) carried out the original Dr Fox study that looked at the effect of lecturer expressiveness on students' perceptions of lecture material. Their conclusions clearly pointed to students' perceptions being swayed by the expressiveness of the presentation and not the content of the presentation. This study came under severe criticism for being methodological dubious (Abrami et al, 1982; Frey, 1979; Ware and Williams, 1975). Although severely criticised the Dr Fox effect was still able to cast a shadow over the use of student evaluations of academic courses. Partly this can be seen as an expression of the academic fraternity wishing to keep control over the evaluations of their courses, after all student evaluations often have funding and staffing implications associated with them. If the student opinions are down graded the academic fraternity is able to play a greater role in the evaluation and related support and development of their course. Marsh and Ware (1982) presented evidence that clearly showed that students were not as easily manipulated in their comments as the Dr Fox effects suggested. In their study they showed that if there was a reward associated with the content then the students were very sensitive to changes in the lecture content irrespective of lecturer expressiveness. The argument goes therefore that there is a reward associated with all lecture content as assessments and because of these students will reliably comment on the content of lectures. It is only in experimental isolation will expressiveness play such a dominant role because saliency of the content has been removed.

The student evaluation provides therefore an unrivalled insight into the academic course. Students are represent non-expert recipients of courses and comment on them from the most important perspective for any educational system, that of

learners. The notion of student comments being naive or fickle vastly undervalues the sophistication of students and their desire to positively benefit from teaching. Research that supports such a position is based on evidence that places lectures in isolation of both of courses and from student interest. The questions surrounding this research are such that it should be cast aside. In conclusion to his 1991 review Ramsden felt able to comment;

> "The general consensus is that there is no other single measure of teaching which is potentially as valid" (pg 132).

The validity and value of the student voice in academic research are paramount and the use of this information gives an unrivalled insight into the educational experience itself. A conclusion which Remmers reached in 1958;

> "Undergraduate comment as a criterion of effective teaching ... can no longer be waived as invalid or irrelevant" (1958, pg 4).

From this insight into the research surrounding student evaluations it can be concluded that the use of student evaluation within this study is not only a valid means of research but the most relevant for gaining insight into the educational experience itself.

Sampling for the study.

As the study to be undertaken was essential an experimental study it was of central importance to gain a sample that was representative of the whole student population. However, there were a number of constraints placed upon the sampling due to the desire for the study to be ecologically valid; this demanded that the study used actual degree courses. Not only did the sample have to come from actual degree courses, but also, in order that the information presented was the same to each group, the degree courses had to have the communications

option (which forms a part of the university's plan to unify much of the first year degree courses.) Once identified the researcher then had to gain access to these groups.

Kolb's argument that specific degree courses represent specific learning styles (1984, pg 86) was used to purposively sample the student population. The notion was that if a degree course from each of the four learning styles were chosen this would create an even spread of learning styles within the experimental sample, according to Kolb's theory. This hopefully would overcome any sampling bias that could arise within the sample, such as occurs with the regular use of psychology students as the sample population in psychological studies. Even if Kolb's predication of the association of learning style and degree course are not supported by this research, the selection of the four degree courses was from a diverse range of areas that hopefully would allow the sample to be at least random.

The groups eventually accessed were:

Physiotherapy students	- Predicted by Kolb as Accommodators[16]
Statistics students	- Predicted by Kolb as Assimilators
Nursing students	- Predicted by Kolb as Convergers
Psychology students	- Predicted by Kolb as Divergers

[16] For statistics, nursing and psychology students the association between learning style and degree course is taken from Kolb (1984) figure 4.4, pg 86 "Average LSI scores ... by undergraduate college majors". However, in this table only one discipline was shown in the accommodator quadrant, that is business studies, and it was not possible to access such a course within this research. The use of physiotherapy students is justified via figure 4.5 pg 89, which shows the learning styles of various professional groups. As physiotherapy is a vocational course it was felt that the degree course would reflect the reflect another of the professional group, hence physiotherapy students were used to represent the accommodator learning style. It must be noted that the use of these student groups is reflects the desire to get a broad cross section of learning styles within the sample and according to Kolb, the four selected student groups should facilitate this. However, nothing in this study is contingent on the student groups reflecting a specific learning style as Kolb claims they do, and the study could have been effectively carried out using any group of students.

Reliability.

It was important that the experimental variables, the style of presentation and type of control within the lectures should be reliable if any conclusions were to be based upon them. Reliability is demonstrated by replication; the experimental design used here has in built replication of experimental variables. That is, the four degree courses effectively are independent; in that they have their own set of four lectures presented to them. In total sixteen lectures, four of each type were presented. The ratings of the same type of lectures will be compared in order to discern whether the style of presentation and type of control has been reliably presented across the four lectures. If reliability in presentation has been achieved the rating of the students will not be significantly different, if however, significant differences were found this could indicate the presentation of the experimental variables was not reliable (it could also indicate thematic differences in perception between learning styles). This achieves internal reliability for each lecture type, that is all holistic student controlled lectures would exhibit the same characteristics. However, it was necessary to establish a level of reliability between the different types of lectures. It was import that what varied between the lectures was the type of presentation not that there were 'material' differences between the lectures. For example, the content of lectures was held relatively constant so as to avoid differences in perceptions simply due to content. For this reason standardised procedures were used for the presentation of the lectures. These procedures were based on the students identified positive features of a lecture. Hence all the lectures had handouts, OHPs, breaks, humour and the lecturer adopted an 'approachable' stance. The information that was actually presented also remained constant between lectures, hence analytical lectures with their brief bullet points did not contain more information that the holistic lectures, they worked to the same information plan. Standardising the lectures in this way allowed the major differences between the lectures were the way in which they were presented. Allowing a positive rating of an analytical lecture to be interpreted as a product of that style of presentation not due to differences in the physical content of the lecture.

Validity of study.

It was important to this study that the results gained should reflect students' opinions of actual degree courses and not their opinions of artificial experimental lectures in a laboratory setting. Ecological validity was of paramount importance. For this reason the research adopted a field study approach. The lectures used within the study were part of the student's compulsory degree course. It was felt this was by far the best way to achieve 'a natural environment' for the research. (Although as stated above it caused problems well selecting the sample population for this study.) As one of the epistemological priorities was valuing of students' opinions, it was important that these opinions were gained about lectures that as closely resembled an academic lecture as possible. For this reason all lectures presented were:

- Part of an actual degree course.
- Assessed as part of the course evaluation.

The benefits of this were that the experimental lectures would have similar levels of importance to that of any degree lecture, hence there is no reason to believe that the student would not exhibit similar levels of motivation and engagement with the lectures. This could have occurred were a lecture purely part of a laboratory study and without impact on the students' actual degree.
Such an approach to research does bring with it some ethical considerations and limitations to experimental design of the research. As the lectures did form part of the students' degree courses it was important that the lectures presented should not actively undermine the students ability to learn, hence all lectures contained the five student identified beneficial features of lecturing, which hopefully would allow the students to gain something from the lecture even if it was not matched to their style of learning.

Stages of study and outline of data gathered and aims for data.

Data Gathering Method	Type of Data Generated.	Aims.
1. General Insight Questionnaire.	Lists of good and bad features of lectures as perceived by students	Inform student focus groups, if necessary, from student perspective not researchers (see Giorgi 1985).
2a. Focus Groups Part I.	Small group brainstorm networks about lectures (see appendix)	Reflection and awareness raising in students.
2b. Focus Groups Part II.	Whole group network of perceptions of lectures.	Further awareness raising plus insight in level of consensus within the group, concerning perceptions of lectures. Information on which to design the experimental lectures.
3. Biographical Information questionnaire.	i. Biographical information about participants. ii. Personal list of seven positive and negative aspects of the lecture. (Informed by stage 2.)	Independent variables to aid with analysis of data generated. Personal attitude towards lectures to compare with learning style and other generated data.
4. Lecture Perception questionnaires (x4).	Numeric and verbal data reflecting students perceptions of lectures	Possible development of thematic response to lectures by students with the aim of improving student perceptions of lectures

Table 4.2 Detailed outline of the study and the aims for each stage of the study.

Outlined above are the main stages of the study that has been carried out, giving a brief insight into what data was generated and how this was exploited. An important point that should be noted is the aim of the study to continually refer to the students' perspectives or perceptions of the situation rather take the researcher's definitions of a situation, e.g. focus groups part II, being used to design the experimental lectures.

Preliminary Study.

Stage One.

The aim of the first stage of the study was to generate student opinions about lectures, both the features that made them good and the features that made them poor. The information from these questionnaires was to be used within the student focus groups, if the group needed information to catalyse the discussion about lectures. It would have been easy for the experimenter to give ideas to stimulate any focus group that was having difficulty getting started, but this might have shifted the emphasis away from student concerns to those of the experimenter/ lecturer. Hence collecting student generated information in this area would help focus group discussion always to reflect a student perspective.

Stage one was carried out with a group of 60 Business Communications students. The students were given a simple guide sheet that asked them to note seven positive features of a lecture and seven negative features of a lecture. The students were free to note whatever they wished with no intervention from the experimenter.

This information was then simply collated into similar topic areas and presented in pie charts. No attempt was made to interpret this information; it was left open to the later focus groups to place any relevant interpretation it. The aim for the research was to leave the information as close as possible to the original generated by the student group, while recognising that it would have to be collated into a manageable form if it was to be of use to the later students.
Business Communications students, if typical of Kolb's Business Studies students, represent Accommodators; hence it could be argued that the views of lectures would be those of Accommodators. However, the lists generated by the guide sheets were merely there to stimulate discussion within the group and hopefully catalyse the ideas of the group. They were not meant to be agreed with by the group or used as a template. It was felt that even though theoretically the students

used to generate the 'lecture features list' were of a specific learning style, this would not invalidate the use of these features.

For this type of information gathering there is no recognised method of collection, what was used here was a simple prompt sheet, rather than a questionnaire. The reason for this was that it was felt the method of collection should be left as open as possible, so the students could express whatever features of lectures were salient to them. It was decided that specific questions about areas of lectures or focusing students on 'important' issues, could act to limit the students' freedom of expression. For this reason a simple prompt sheet was used (see page one in methodology appendix). While designing the prompt sheet, question design issues from questionnaire construction were taken into consideration, mainly that the questions should be direct and only ask one question.

N.B. The information gathered during this stage was merely a research tool and did not constitute part of the data to be analysed.

Stage Two - Focus group research.

The methodology used during this study (questionnaires, experimental procedures) mostly follows a fairly standard format and as such requires little in the way of explanation. The use of focus groups however, departed from the common usage, in an attempt to create a totally participant controlled group, with the aim of keeping the data gathered tightly centred on student perceptions.

Historical perspective on focus groups.

The focus group as a research method is most often associated with market research, that is, within a more business research environment rather than in traditional academia. This has caused certain areas of the focus group to be

emphasised, for example, the cost effectiveness of this research technique is often brought out, (Sevier, 1989; Berhs, 1989; Betrand et al, 1992.) the focus group in these cases is portrayed as a group interview where a single researcher (the moderator) can gain the opinions of a group of participants in a single meeting, rather than a series of individual interviews with their associated time consuming costly interview transcriptions. Transcriptions are reduced to a single group transcription, with the associated financial and time advantages.

Although the focus group came to be the epitome of marketing research its actual foundations are to be found outside that area. Merton et al (1946) were the first to record using the focus group as an integral part of their research procedure. Merton et al were studying the effectiveness of war time propaganda, clearly placing the origins of focus groups within the social sciences. Despite this and later work by Merton (1956), the focus group was rarely used within the social sciences until much more recently (1980's). The transition of the focus group from academia to marketing can be traced to the work of Lazarsfeld, who although a sociologist himself, working extensively with quantitative research methods, also placed an emphasis on qualitative research. His work within marketing and qualitative research brought the focus group into vogue within marketing. Lazarsfeld demonstrated within his own research the effectiveness of the methods. This use of the method was cited by Morgan (1988) as a possible reason why the focus group failed to be taken one board by the peers of Merton et al. Although Merton et al forwarded the research method, their own research showed little sign of its practice. As Morgan states, "In the *Student Physician* (1956) Merton et al made wide use of tabulation from survey data and quotations from the diaries that the students kept, but only mentioned in passing that they had also used focus groups". This lack of apparent support for the focus group by its advocates casts it in a very poor light.

Here we have carefully referred to the 'focus group method' but a common, perhaps more often used title is the 'focus group interview'. This immediately categorises focus groups alongside the interview. As the interview is the vastly

more established method its features will dominate any perception of focus group interviews, giving the impression that the focus group is an interview with a larger number of people. Thus an interview guide/question list will be required; open and closed questions slotted in as appropriate. Given this possible or probable perception of the focus group, it can be difficult to see the great advantage this method has as a new research technique. Apart from its cost effectiveness, which the business world readily keyed into, the only immediately discernible advantage is that group interaction may be noted also, but as Morgan (1988) notes, "we can never be sure how natural the interactions are". If group interactions are really the goal of the research, participant observation may well produce a better impression of interaction in 'real' situations, being able to observe disagreement for example. Given this image of the focus group it is of little surprise that it developed slowly and remained until very recently a rarely used research technique within the social sciences.

Another possible reason for the long gestation period of the focus group is that the original work of Morton et al (1956) made extensive use of story boards as prompts to discussion, (a format that fitted neatly with the study of propaganda). However, it was difficult for later researchers to see how they could fit their research topic into a story board format, especially if exploration were the goal of the research. Exploration could be stifled by a prescriptive story board format. Hence this could have caused the marginalisation of the focus group, seemingly requiring technical tools in order for it to operate effectively.

Since the early 1980's however, the focus group has taken off as a research tool, one possible reason for this is that social scientists now have a better understanding of what a focus group is. One possibility for this is proliferation of texts on the topic (Higginbothan and Cox, 1979; Morgan, 1988; Krueger, 1988; Goldman and MacDonald, 1988; Stewart and Shamdasani, 1990.) It is difficult to say whether these texts are a response to or are causal in the increase in use of the focus group, but without doubt the potential focus group researcher is better informed than in the early 1970's. Due to the increased knowledge about the focus

group opportunities to challenge the design have arisen; creating possibilities of a more flexible approach to focus group research. This the what the present research has done, challenging the make-up of the process while keeping true to the notion that the focus group provides an insight into individual feelings and beliefs.

The focus group compared to other research methods.

The focus group attempts to access information that is similar to that which is gained by the survey: information about the opinions within a population. Marketing research, one of the main users of the focus group frequently exploits it to inform surveys, to pilot questions and gain the vocabulary used by the target group; with the aim of increasing effectiveness of the subsequent survey (Lang,1979). The survey itself is frequently used within both business and academic research and has a recognised level of validity and reliability associated with it. Ward et al (1988) carried out a comparison of data gathered from three studies via surveys and information gathered on the same topics via focus groups. 88% of the variables identified by the two methods were similar. In fact for 42% of the variables identified the focus groups provided more detailed information. Ward et al do note that the focus group and the survey and not completely comparable and are not interchangeable methods. The survey generated more information on 17% of occasions and this tended to be when the design of the survey was to purposefully elicit information, which would have to be volunteered by the focus group. Where the focus group benefited was with the quality of the information generated, which tended to be "[more] in-depth information on the topic at hand." Having noted where the two methods diverge it must be noted that for the majority of identified variables both the survey and the focus group elicit the same amount of information. This indicates that as a research approach it is not "soft" but offers the same degree of reliability (when used appropriately) and validity as a survey. Ward et al simply state that "focus groups represent a viable alternative for obtaining information on the attitudes, beliefs and behaviours of a given population." When compared to the individual

interview the focus group produces an extra layer of information, that is, the actual interaction that occurs within the group. This level of information is not available to the individual interviewer. Levy (1979) notes that the group interaction gives an insight into the vocabulary, but more importantly (especially for the market researcher) an indication of when people are "willing to challenge others and how they respond to such challenges." An area that would be blind to the researcher using the individual interview or surveys.

Fern (1982) counters this purely positive image of the focus group when compared to the individual interview by showing that the focus group did not produce significantly more or better data ideas than a comparative number of interviews. In fact the focus group only produced 70% as many ideas as the equivalent number of interviews. This indicates that the use of focus groups has to be carefully targeted, if the aim of the research is gathering a large bank of information the interview would be a better research tool, but if time was limited the focus group could provide a way of collecting the majority of issues..

The relatively unstructured approach to focus group research can be seen as a distinct advantage. Morgan (1988), who perceives it as an exploratory research tool, whose advantage lies in "the ability to conduct research with less in the way of a prepared interview". Giving a clearer 'voice' to the participants, who can shape the direction of the discussion more freely than in an interview. It must be noted that the 'trade-off' for such freedom of discussion is data that may be "a chaotic collection." Data collected via the interview would be more orderly.

When compared to the interview the focus group offers a freedom of research that is lost in the more structured interview. However, when compared to participant observation it is the comparative level of control that is highlighted as the focus groups largest weakness. The focus group activity is a forced situation, people are brought together, given a question and expected to interact 'naturally', something that is bound to be limited by the artificial nature of the of the focus group set up. Participant observation studies are a far more natural environment and collect

more than group interaction in the data collection. Morgan (1988) presents the advantages of participant observation as being; "collection of data on a larger range of behaviours, a greater variety of interactions and a more open discussion of the research topic." In light of these advantages the focus group appears to be somewhat rigid in its approach to data gathering. However, the advantages of the participant observation can be cancelled out by the difficulty in actually finding a suitable situation which one can observe. Also when carrying out participant observation, one is viewing a very dense field of information that is difficult to reduce down into noteworthy categories, especially in diffuse and multi-faceted situation. Thus although participant observation has clear advantages it is not the case that it offers a simple and advantage over focus groups but rather is an excellent method when research topic and availability come together.

Type of Research	Advantages over Focus Groups	Focus Groups' Advantages
Participant Observation	1. Study Larger Range of Behaviours 2. Greater variety of Interaction studied. 3. More Naturalistic.	1. More readily Available - finding group to observe can be difficult. 2. More controlled and focused collection of data.
Individual Interview.	1. Generates more research data. 2. Structured data gathering.	1. Gain data about group interaction. 2. Participants more able to steer and change group discussion. 3. Reduced chance of research bias.
Survey.	1. Target a very large research population. 2. Recognised measures of reliability and validity. 3. Probabilistic	1. Gain data about group interaction. 2. Provides additional detail to that gained by comparable surveys.

Table 4.3 Comparison three research methods with focus groups.

From what has been presented it can be concluded that focus group research is not a universal panacea, there are situations where the focus group is not an appropriate research tool. This agreed, however, it has been shown that the focus group is more than a simple market research device used to help aid the design of

surveys. It can exist as an end in itself, proffering useful and insightful information, when used appropriately.

The flexibility of focus groups.

	1. Use Focus Group.	2. Don't Use Focus Group.
1	When gaining exploratory data.	When research has a series of questions to ask.
2	In-depth inf. into topic is required	Broad overview of area is required.
3	Data concerning group interaction is required.	Series of individual perspectives is sufficient data.
4	When "real" group in field cannot be found.	If readily observable "real" group is available.
5	Time available to analyse what can be chaotic data.	Data that needs to be quickly and efficiently interpreted.

Table 4.4 Appropriate and inappropriate conditions for focus group research.

The above table gives an indication of when ideally to use a focus group and when ideally not to use a focus group. This does not mean that the focus group can only collect from specific areas in certain ways, but rather that if one's research has any of the features in column two other research methods may be more suited to the job. For example, it would be possible for a focus groups to be used to ask a series of questions with the aid of a skilled moderator, but the researcher may be well advised to use a survey to collect this data because this more effectively channels the respondents answers onto specific questions (Ward et al, 1991).

What must be noted is that often there has to be some form of compromise within research, such as when broad overview information is required but group interaction is also of interest. Here the researcher must decide which are most important and choose what they perceive to be the most appropriate research method. Hence the table is not meant to be a list of definitive rules but rather an

indication of areas that should be taken into consideration when using a focus group.

Although there are ideal situations in which to use focus groups and situations that are completely inappropriate for this method, this does not mean that the focus group needs to be viewed as a fairly rigid research tool. Berhs (1989) pointed out that a focus group really only needs six basic features to be classified as focus group research.

1. Small in size, 6 - 12 in the group.
2. A homogeneous group of participants.
3. Have a trained moderator.
4. One and half to two hours long.
5. Non-threatening / relaxed atmosphere.
6. Selected topics.

These basic features are quite broad and not equivalent to a heavily structured approach. As noted above this research abandons the notion of a trained moderator within a group but keeps to the overall idea that a group will require some form of moderation to aid the discussion process (these are designed into the focus groups used here). The actual design and process of the focus group can change quite dramatically and still remain within the classification of a focus group. However, there is one feature of a focus group that remains fairly rigid that is the overall goal of the method, that is according to Berh, "to elicit the participants perceptions, feelings, attitudes and ideas." This is the one feature that unifies all focus groups. The focus groups carried out by Merton and those carried out within this research are quite distinct regarding the actual research format. However, the two focus groups both had the goal of gaining the perceptions of the participants.

Challenges to the traditional approach of focus groups.

The need for moderator.

Much of the work carried out in marketing uses focus groups as a form of group interview. This gains information economically from groups of individuals, while at the same time noting the dynamic interplay that exists within the group. It is thought that such groups require a moderator to control and order the discussion. The moderator is perceived by such research as central to the study. Sevier (1989) goes as far to state "is not an over statement to say that the success of a focus group depends on the skills of the moderator". The implications of this are that the moderator needs to be highly trained and skilled in interpersonal and non-verbal communication processes, and to understand the interactions that occur during a group discussion. The moderator therefore can be one source of problems within a focus group; if the moderator lacks the required skills or knowledge they can impede or even stop the natural flow of the discussion, resulting in stilted debates that does not reflect the true ideas or opinions of the group. Such problems are recognised in the literature; Berhs (1989) notes that, "Many researchers are accustomed to working with 'things' ... Not all researchers are capable focus group moderators, and they should not try." Clearly moderation is not an easy role. The consequences of a poor moderator are also highlighted within the literature. The difficulty of being objective when a person is involved in the research was indicated by Sevier (1988) "If the moderators are involved in the research ... they are bound to be biased." The answer forwarded by Sevier to this problem was "the use of an outside moderator may provide objectivity." This would deal with the immediate symptom but leaves the underlying cause unchecked: that there is a member of the discussion who is not part of the group. But does a focus group need a moderator?

The difficulties created by the cannot be ignored when using focus group research. Here we propose a possible solution for some focus group work, which may eliminate the problem of the moderator all together. The idea is simply to

remove the moderator from the process. At first this may seem like an unnecessarily drastic step that may do more harm than good. It will be argued that a moderator is not essential within a focus group; that the group can operate without them and may well even provide better information.

There are a number of objections that could be raised to this idea of removing the moderator. Firstly there is the notion that group will discuss just one area, or even topics that are irrelevant to the subject being studied, if left without the guidance of a moderator. Plainly this possibility cannot be ruled out, but then again, despite the efforts of many a skilled moderator, group discussions have gone off at a tangent and not remained tight to the original topic. The group can be 'moderated' not to go off on a tangent by a good research question that is given to the group, one that is clear and promotes debate on the subject. A stimulating question may be all that is needed to keep the discussion to areas that are relevant (for the group). Also it is worthy of note that the group will be made of people who probably volunteered and are interested in furthering the research; pertinent discussion of the research question is why they are there.

Secondly, it must be noted that the group will already be highly skilled communicators, having spent a lot of their lives discussing and debating issues- but in informal groups that although never recognised as a focus group will have many similar characteristics. So from the very start the group may well already have the level of expertise required to operate in a focus group. There are other ways in which the focus group environment can be shaped to reduce the chance of the discussion becoming distant from the original question. These will be presented later, but there is a more central issue that should be presented first, that being the importance of group discussing exactly what the researchers had hoped they would. If a un-moderated group discusses a small area around a topic, could it not be that this is the area that is most salient and important to them? If a group brings in novel ideas into the discussion, is it not that they thought that the ideas were relevant and helpful? Much of the reasoning for having a moderator assumes that given the slightest chance the group will discuss something else, or without

the moderators help they will have a limited view of the question (Sevier 1989), such a view does not place one's source of data in very high regard. This study aligns itself more closely with Rogers interpretation of the actions and interactions of people

> "Yet one of one of the most refreshing and invigorating parts of my experience and to discover the strongly directional tendencies which exist in them, as in all of us, the deepest levels." (Rogers, 1961).

There are other benefits of removing the moderator from discussion. Morgan (1988) notes that people are most likely to openly discuss with 'like types'. The addition of a moderator to a group of 'like types' can only have an inhibiting effect if Morgan's assumptions are correct. Even if the moderator is similar in appearance and background, their note taking and questioning will generate the view that they are an authority/controlling figure with the subsequent effect on discussion. Unless the moderator acts covertly within the group (something that would be difficult both ethically and practically) they will be perceived as different and act as an inhibitor on 'like types' freedom of discussion.

Implicit within the use of a moderator is a psychodynamic perspective. Langer (1978) advised that moderators should undergo psychotherapy in order to have first hand experience in "psychodynamic" approach to study, and he also commented that a background in clinical psychology was preferable for a moderator. The driving force behind this approach to focus group moderation is the desire within (marketing) research to identify motivating forces that are either repressed in the unconscious or unaware in the preconscious. As this research is not about motivations hence the need for a moderator within the research is severely reduced.

The moderator may also act so as to remove bias that exists in the wider group that they are studying (by valuing statements that would be marginalised by the group under normal situations). This would cause the focus group to present a

well-rounded image when the wider group they come from is biased or concerned with far fewer issues. Sevier suggests that the moderator should "control the time spent on unanticipated questions". Indicating that the discussion is shaped by the moderator to the agenda of the researchers. It is argued here that the group should be left to act as a moderator unto itself. This will allow the participants to set their own agenda and reflect on it as they see fit.

Leaving the group to moderate itself, does not mean that this study 'naively hopes for the best'. Systems are in place that engineer a situation where the group is likely to discuss the pertinent issues while leaving this in the control of the participants not an outside agency. Morgan described this type of situation as one of the advantages of the focus group, "One advantage of group interviewing is that the participants' interaction among themselves replaces their interaction with the interviewer, leading to a greater emphasis on the participants point of view." This would clearly provide the researcher with a greater insight into the participants' perception of the issues.

The aim of this critique of the moderator is not to dismiss them from focus group research altogether but rather not take it for granted that all focus groups must have a moderator. There are cases where the benefits of the presence of a moderator may out weigh the losses. For example, when a discussion area is new to a group and they may require guidance or where a topic is emotional and participants may require support in order to openly discuss the area. However, when an area is more open and impersonal the group may operate more effectively without a moderator.

<u>Guidelines adopted to encourage good, moderator less discussion.</u>

1. Opinion/experience is fundamental to the focus group question, therefore there is no right or wrong answers, nor or any need 'crush' someone else's point, as may occur if more factual basis to the question.

2. The aim of the group is not to achieve consensus but rather an exchange of opinions. This increases the freedom to present whatever is thought appropriate, reducing the possible influence of social desirability and peer pressure, which may occur if consensus was required within the group.

3. Groups made up of people with similar background (in respect to the question - in this study first year students of the same discipline). Hence there is a common background/experience from which to discuss the question. The groups however, where not made up of close friends, who might feel obliged to support each other.

4. Clear specific catalyst question - "Discuss the features that make a lecture good and those which make it poor". (pg 265) Berhs (1989) supports the notion that a clear question can aid relevant discussion. "Without a clear definition of purpose by the researchers the discussion may ramble on over a multitude of topics."

5. Two-phase focus group format.

Phase one - whole group splits up into small focus groups to work on question.

Phase two - whole group reforms, each phase one group acting as if an individual in a large focus group. Any phase one group that discussed one area or areas at a tangent will become aware of what the rest of the groups discussed and may choose to moderate or ignore their responses.

6. Individual final comment sheets - a personal confidential final response to the focus group question. Here the person is able to present final opinions and not worry about any aspect of group consensus or social desirability.

All these features will hopefully act as influences on the focus group discussion, preventing the groups discussing irrelevant information, while at the same time giving control over to the group to decided what is relevant to the discussion.

Data generated by focus groups.

The information generated by this approach to focus groups will not fit neatly into any of the models of focus group research. The traditional data generated by the focus group is a recording of the group discussion and the notes of the moderator. Bertrand et al (1992) presents three structured approaches to analysing traditional focus group data, noting the relative validity and reliability of various approaches. Unfortunately however, the approach to focus groups used in this study does not generate a recording of the discussion or moderator's notes.

Generated instead is:

1. Phase one group opinion/ideas networks.
2. Phase two whole group networks.
3. Individual comment response sheets.

The analysis of this data is not completely different from more traditional focus group research. One similarity as far as the analysis of data is concerned is that the researcher can choose what sections of the data to analyses. The final responses can be analysed alone (as is the case in this study), the comments on the group networks analysed or all the data can be analysed together. Where and when the analysis takes place changes the emphasis of the results. If group data is desired the networks are more appropriate foci of study, whereas if it is individual opinions that are sought, the concluding personal notes are most relevant. Notes that form personal, interview like data, that are not available in the traditional focus group format.

Another similarity in analysis is the search for themes within the data. The network produced by the group is in effect a transcript of the salient points of the group discussion. The method of analysis of these networks echoes that of the more traditional research, "Disparate comments are organised by topic and edited in sequential order so that broad themes emerge" (Savier, 1989, pg 10). The same

basic process is used when analysing the focus group networks. The search is for themes and unifying features that give insight into the overall phenomenon under scrutiny.

The form of the findings produced from this type of focus group research do not look different from those produced from a more traditional format. A list of themes that unite the group's opinions and those which differentiate between the opinions is produced. Ultimately this type of focus groups aims to achieve the same goals as orthodox ones: that of gaining opinions from a group of people. A researcher exploiting this technique does not need to be radically alter their working process.

Validity of the focus group.

The focus group has a high degree of face validity, that is, from a 'common sense' position, if one wishes to find something out the best way of going about this is to ask someone. At the same time it is this face validity that causes the focus group to be viewed as "too soft" (Ward, 1991), as no knowledge of high level research techniques or statistics is needed to be able to read and comment on the data produced; the data is very accessible, to the extent that some view the method as lacking academic rigour.

Implementation procedures for focus groups used within this research.

Moderating Factors. **Data Generated.**

Research Question.

↘

1. Primary Focus Group.

↘

⇩ Experience/Ideas Networks.

⇩

Primary ideas networks. ↘

2. Secondary Focus Group.

↘

⇩ Whole Group Experience/ Ideas Networks.

⇩

Whole Group Networks. ↘

3. Personal Focus.

↘

Personal Focus list of

Focus groups as awareness raising.

The focus groups used within this study not only acted as a means of gathering data but also as a way of raising awareness in the students about issues concerning lectures, which would inform responses to later questionnaires and the personal focus at the end of the focus group sessions. "The concern was raised that some questionnaire respondents would relate too directly to *recent* experience rather than to their experience in general". The structured focus group overcame this problem, allowing the students to exchange ideas before being requested to provide personal responses. The design of the structured focus group 'small group discussions', followed by a whole group discussion, overcame the possibility that even a small discussion group may become locked on a single issue, by allowing the whole group to come together and exchange ideas. Any convergent thinking would be broken down. The exchange of ideas in the small and whole group discussions was not an attempt to force a group consensus but rather to allow the final personal focus to be informed by debate and raise important issues that may not have been taken into consideration or brought to the attention of the respondents otherwise.

Summary of focus groups.

The focus groups severed two purposes within this study:

- The collection of data concerning positive and negative features of lectures.
- Discussion and awareness raising of issues surrounding lectures, allowing later responses from the research population to be informed from a broad perspective.

The dual purpose of the focus groups meant that it was a very effective use of the limited contact time available with the research groups.

Stage three - the questionnaires.

Two types of questionnaire was used during the study, an initial biographical information questionnaire and four *lecture evaluation* questionnaires. Both questionnaires were designed in accordance with standard good practice as set out in Questionnaire design, (Heather and Stone, 1991) and Researching social life, (Gilbert, 1993).

Biographical questionnaire.

Unsurprisingly the aim of the biographical questionnaire (See methodology appendix) was to gather information about the students themselves. This biographical information can be divided into three main areas:

1. Personal details such as age, gender, qualifications.
2. Questions focused on students' opinions on the positive and negative features of lectures.
3. Learning style, measured using Kolb's learning style inventory (Kolb, 1985).

Lecture evaluation questionnaire.

The lecture evaluation questionnaire (see methodology)was designed to probe students feeling and opinions about the experimental lectures, in order to discover if the style of lecture had changed their perception of learning within that lecture. The design of this second questionnaire can be basically divided into two main types of questions, Closed rating scales (questions 1, 2, 4, 6, 7, 8, 10, 11, 12, 14, 15, 17) and open questions (questions 3, 5, 9, 13, 16, 18). The Likert scaling questions were able to give an insight into the perceptions and attitudes of the respondents, what they thought about a feature of the lecture and how this effected their perceived learning. This type of question gives a clear indication of the respondents' attitudes but no insight into the foundations of these attitudes. For

this reason the Likert scales were supported with open questions that simply asked the respondent to give reasons for their choices on the Likert scales. As Stacey (1969) noted open questions should be used "where the issue is complex, where relevant dimensions are not known, and where a process is being explore". All of which are true for this study. These more open questions would also allow for differences to be noted in learning styles. It may be that respondents with two learning styles rate the lecture equally but for different reasons, which would hopefully be indicated in the open question.

Piloting of questionnaires.

Both questionnaires were piloted with twenty students. The biographical questionnaire required no further refinement. The lecture evaluation questionnaire needed to be slightly clarified on the questions that asked about the control (question 1) and the presentation style of the lecture (question 4). For these reasons examples of what is meant by *holistic* and *analytical* were written below the Closed rating scales, so the students were aware of what was being referred to. The same was done for the other features of control. When re-evaluated with a further ten students the questionnaire was perceived to be clear and easily understood.

Type of data generated by the questionnaire.

Information from these questionnaires formed the corner stone for this study. Due to the nature of the lecture evaluation questionnaire there were two main forms of data. Numerical quantitative data from the Likert scales and verbal qualitative information from the open ended questions. Although these two types of information had to be analysed separately, the aim of the analysis was to use one to inform and support the other, with neither assuming dominance but both effectively cross referenced each other and created a clear impression of the

situation. Thus the data triangulation approach that was suggested by Denzin (1970, 1978) was exploited.

Summary of questionnaires

During the course of the study each participant will be required to complete five questionnaires, one biographical information questionnaire and four lecture evaluation questionnaires, one for each of the four experimental lectures. Data generated was to be used to evaluate students' perceptions and responses to the various lecturing environments.

Ethical Considerations for Research.

The lectures used as parts of this study were from participants actual degree programmes. This meant that full consideration would have to be given to ensuring that participants' performance on their degree course would not be inhibited, as well as accommodating rigorous ethical considerations.

Ensuring Experimental lectures did not actively inhibit student performance.

Although the aim of this study was to attune the experimental to learning styles, this did not mean that they necessarily actively inhibit the performance of the non attuned learning styles. Five features, identified by students, of lectures were incorporated into the design of all the lectures. These features were identified during the focus group undertaken as part of this study and are as follows:

- Presentation of lecture handouts.
- Use of visual aids, specifically OHPs.
- Employment of short breaks within the lectures.
- Appropriate use of humour within lectures.
- The lecturer should be 'approachable'.

The focus group data from which these five features were established can be seen in Phase One Data Appendix, pg P1 - P20. Also a brief discussion of each of these five features is also presented.

The presence of these five 'student identified' base features ensured that there was a common foundation to all lectures. A foundation that would allow all students to actively learn in all lectures. The aim of this study would therefore be whether this learning could be enhanced by attunement of the lectures to students learning style.

Student consent.

Informed consent to participate in focus groups.

The aim of the focus groups was explained to the students. The students were then informed that any data used from the focus groups would be used anonymously and that the researcher would not be privy to the discussion in the small focus groups. The students were then asked if they wished to participate in the focus groups while being clearly informed that refusing to do so would carry on penalties. Students were not offered inducements to participate in the focus groups. All the students agreed to participate in the focus groups.

Informed consent for experimental lectures.

As the lectures were part of the students' degree programmes it was important to gain from them. Informed consent was needed for both the implementations of the experimental lectures and their participation in the completion of questionnaires.

Consent for implementation of experimental lectures.

Before the study was undertaken the students were asked by the researcher if four of the lectures they were to receive as part of their course could be presented in a specific style. They were informed that the lectures (in common with all other lectures they received from the experimenter when acting as their lecturer) would have the five noted student identified features, but the actual style of presentation may be altered. They were informed that they could refuse and this would have no effect on them personally or the course. No inducements were offered to any of the students to agree to participate.

Students responded by anonymous ballot - all students agreed to the experimental lectures being presented.

Consent to complete questionnaires.

Once consent for the lectures had been gained the students were asked if they would give their consent to complete questionnaires. These questionnaires would be anonymous and the responses would have no baring on themselves or the course. Again the students were informed that they could freely refuse not to participate and no inducements were offered to the students to participate. Students responded by anonymous ballot - all students agreed to participate.

Students not present when consent was given.

Students who were not present when the consent to complete questionnaires was gained were approached by the researcher prior to them receiving a questionnaire. The same opportunities to refuse to participate without prejudice to themselves or the course was offered. As the rest of the group had consented the experimental lectures to be presented, these students were informed about the experimental lectures but were not allowed to veto the lectures. However, all these students also consented to the presentation of the experimental lectures.

Anonymity.

One ethical consideration that had to be dealt with was anonymity of the participants' responses. It was necessary as part of the design of the study to be able to collate the four questionnaires of a single student. This meant the questionnaire had to be identifiable in a manner that would allow students to remain anonymous. It was decided that the students permanent home post code

should be used for this purpose. The participants agree to this and placed their home postcode on any questionnaires they completed.

Research Procedure.

Implementation Procedure for Study.

Stage of study	*Procedure implemented*	*Date of implementation*
• Preliminary data gathering	Focus groups	September 1994.
• Data gathering for experimental lecture design	Focus groups - Implanted according to design forwarded in methodology.	November 1994 - four focus groups were undertaken, one with each of the degree disciplines used within the study.
• Experimental lectures	Presentation of the four experimental lectures to the four degree disciplines.	Throughout February for nursing, physiotherapy and statistics. March for Psychology.
• Clarification interviews	Interviewed four students about understanding of analytical and holistic	December 1995
• Supplementary Data collection	Repeat of Kolb's LSI with nursing students only	December 1995

Participants.

Academic Discipline	Number of Students	Learning Style According to Kolb
Statistics Students	47	Assimilator
Physiotherapy Students	30	Accommodator
Nursing Students	29	Converger
Psychology Students	12	Diverger

Table 4.5 Showing number of students from each degree course and associated learning styles.

Preliminary Phase.

One aim of this study was to gain access to student general opinions about lectures. This material was gathered from students who did not take part in the final study. The information gathered was to be used with any focus group that was having difficulty in answering the question. Thus if a focus group asked for help in answering the question this general student generated information could be used cue their ideas. This was done so that the generation of the information remained tightly on the students own idea. N.B. during the study no student focus

group requested this information and all groups were able readily and rapidly engage with the focus group questions.

Phase One.
Focus groups.

The focus groups were carried within each discipline group. Focus groups were broken down into five main stages.
1. Instructions to whole group.
2. Small focus groups.
3. Whole group focus group.
4. Individual responses based on focus group experiences.
5. Completing of Kolb's learning style inventory.

Number of small focus groups used.

1. Physiotherapy students were broke down into 11 Small focus groups.
2. Statistics students were broken down into 7 small focus groups.
3. Nursing students were broken down into 7 small focus groups.
4. Psychology students were broken down into 3 small focus groups.
(Each small focus group contained approximately four students.)

Phase Two.
Experimental Lectures.

Procedure within experimental lectures.
The lectures were presented in accordance with assigned style and control. At the end of each lecture the students were asked to complete the experimental questionnaire, (See methodology appendix) asking them to rate the control and presentation of the lecture and their reactions to these.

N.B. Due to the 'Cycle one' programme at Sheffield Hallam University (A rationalisation of first year courses, where many degrees have the same core units) It was possible to teach the degree groups the same topics as part of their *Communication Core Unit.*
It was not however possible to teach the psychology students the communication units (Due to time tabling difficulties) this group in contrast to the rest received four lectures on personality theories.

The control type and presentation style of the lectures were systematically varied to avoid any order effect due to the repeated measures design of the study. The topics were also systematically varied in this way to avoid a single topic becoming associated with a particular style of lecture. This also pre-empted the possible criticism that certain experimental lecturing types were only possible with specific types of information or lecture topics.

Experimental lectures presented to student groups - Week One.

	Type of Control	Style of Presentation	Topic
Statistics Students	Lecturer	Analytical	Language
Physiotherapy Students	Student	Holistic	NVC
Nursing Students	Student	Analytical	Mass media
Psychology Students	Lecturer	Holistic	Watson and Palov

Table 4.6 Showing experimental lecture type and lecture topic for each degree course for week one.

Week two

	Type of Control	Style of Presentation	Topic
Statistics Students	Student	Holistic	NVC
Physiotherapy Students	Student	Analytical	Mass media
Nursing Students	Lecturer	Holistic	Effective decision making
Psychology Students	Lecturer	Analytical	Skinner

Table 4.7 Showing experimental lecture type and lecture topic for each degree course for week two.

Week Three.

	Type of Control	Style of Presentation	Topic
Statistics Students	Student	Analytical	Mass Media
Physiotherapy Students	Lecturer	Holistic	Effective decision making
Nursing Students	Student	Holistic	Language
Psychology Students	Lecturer	Analytical	G.Kelly

Table 4.8 Showing experimental lecture type and lecture topic for each degree course for week three.

Week Four.

	Type of Control	Style of Presentation	Topic
Statistics Students	Lecturer	Holistic	Effective decision making
Physiotherapy Students	Lecturer	Analytical	Language
Nursing Students	Student	Holistic	NVC
Psychology Students	Student	Analytical	C. Rogers

Table 4.9 Showing experimental lecture type and lecture topic for each degree course for week four.

Supplementary data collection.

In an attempt to clarify some of the issues generated by the analysis of the data collected a further stage was added to the study. (This stage of the study was undertaken with nursing students only as this was the only group that still meets as a whole group, the other groups having been split up into various special options.)

The Learning style inventory was re-administered in order to assess the test re-test reliability of Kolb's learning styles.

Rotter's locus of control assessment was administered to assess if students' responses to the shifts in the 'power' balance within the experimental lectures related to students' perception of learning in lectures.

A forced choice rank ordering of the lectures by students was implemented in order to discover if the students' results were suffering from students assessing each lecture in isolation and so the perceptions of the students would be qualified with 'of that type' .

CHAPTER FIVE : RESULTS

Results.

Rationale for each stage of analysis.

The analysis of the data collected comprises two basic stages, validation of implementation of experimental lectures and testing of experimental hypothesis.

Validation of Study.

The first section of the analysis looks at the implementation of the experimental lectures. This process also can be broken down into two stages; the analysis of control and presentation style of lectures; and the analysis of OHPs and handouts.

The analysis of control and presentation style. The analysis here is seeking to discover if the type of control (Lecturer, Student) and presentation style (Analytical, Holistic) were effectively manipulated during the experimental lectures, for example were analytical lectures rated as such by participants? The analysis also seeks to discover if the four lectures of each type were presented uniformly, for example was the lecturer controlled analytical lecture presented to the psychology group the same as that presented to nursing students? It is important that the lecture' formats were stable so that comparisons between the lectures can be made.

The hypotheses presented are:

1. The experimental lectures type of control and presentation style will be rated in line with the experimental design.

2. There will be no significant difference in the rating of the same experimental lectures presented to the different degree course groups.

The analysis of OHPs and Handouts: The analysis here is undertaken to further confirm the uniformity of the general features of the presented lectures. That is to

verify that what differs between the lectures is the type of control and presentation style and not the content of the OHPs or handout presentation style, for example. If these general features did in fact vary it would be difficult to make any conclusions about possible differences in the responses to the experimental lectures; since the source of the variation would be unclear.

The presented hypothesis states:

1. There will be no significant difference in the rating of lecture OHPs and handouts within or between the experimental lecture types.

Testing of experimental hypothesis.

The analysis of effect of experimental lectures on perceived learning: Three questions from the data collection address this issue, effect of control, effect of style and the overall rating of the lecture. The first two questions are designed to give an insight into the effect of the specific features of the experimental lectures. The final question is designed to gain an insight into the general impact of the style of lecture on the participants' perceived learning.

The hypothesis presented states:

1. There will be a significant difference in the rating of the effect of lecture control on perceived learning between the five learning styles.

2. There will be a significant difference in the rating of the effect of lecture style on perceived learning between the five learning styles.

3. The most positive overall rating of a lecture will be gained from the learning style which is attuned to that lecture.

Imputing[17] of data.

Part of the experimental design of this study was to exploit 'real' lectures which were part of the participants' actual degree programme. This allowed the study to present lectures which had true saliency for the participants and therefore would be attended to by the students with attention comparable to any other degree course lecture. Such saliency would be lost with laboratory style lectures, creating doubt concerning the applicability and generalisability of data. Although bringing considerable rewards such an experimental design also has its problems. The main problem as far as this study is concerned is that the students were free to attend

[17] Imputing is used to refer to the way in which missing data was delt with for analysis.

the lectures as they would any other lecture on the course (lecture attendance is not compulsory on the degree programmes). This meant that not all students attended all lectures; making the lectures compulsory would instantly destroy the 'naturalistic' design of the study. Analysis of the data reveals the following attendance across the four experimental lectures.

36 Participants attended all four experimental lectures.
41 Participants attend three experimental lectures.
33 Participants attended two experimental lectures.
8 Participants attended one experimental lecture.

If analysis of the data was to use repeated measures techniques, it should only be undertaken on those participants who attended all lecture conditions. Attendance at all lectures for this research was 36, it was felt that this figure was small and when divided down into degree courses became exceptionally small (Only four psychology students attended all lectures). For this reason it was decided that data would be imputed for those participants who attended three lectures; this would establish a population of seventy seven. This established a reasonable number of participants from each degree course; 35 Physiotherapy students, 14 Nursing students, 20 Statistics students and 8 Psychology students
(N.B. this procedure meant that 16.56% of the total data used within the analysis would be imputed).

Procedure for Imputing data.

The data could be imputed in two ways,

1. From the mean result of that question for the associated degree course. e.g. a missing result for rating of control of a Psychology student would be imputed from the mean control rating for the psychology group.
2. From the mean result of that category of questions for that person. e.g. a missing control rating for lecturer controlled analytical lecturer would be

imputed from the mean of that students' ratings of control for the other three experimental lectures.

(The third possibility of imputing data from 'learning style means' was rejected as this would mean that the possible differences in lectures presented to different degree groups would be ignored, as all learning style were present in all degree groups. This could easily lead to type one error when analysing stability of lecture presentation styles or types of control).

After considering the available methods of imputing data it was decided that the method that would be used would be that which used the individuals' scores for the rating of that category of questions. This conclusion was reached because this method would be the most stringent on the experimental hypothesis, reducing the chance of a false positive (type one error) being established[18].

[18] Analysis of the data using the degree course method of imputing data was undertaken. The results revealed no relevant differences to those found when the individual method of imputing data was used. This analysis is not reported here.

Analysis of experimental lectures by degree course.

As stated above the analysis using degree courses was undertaken to validate the experimental procedure and to investigate the stability of presentation of lectures of a given style.

Mean rating of control of lectures by degree course.

	Lecturer controlled - Analytical lecture	Student controlled - Holistic lecture	Student controlled - Analytical lecture	Lecturer controlled - Holistic lecture	Mean rating for lecture control for degree groups
Physiotherapy	2.88 (1.16)	4.35 (1.55)	4.83 (1.62)	3.60 (1.51)	**3.91** (0.97)
Statistics	2.75 (1.02)	4.95 (1.59)	3.76 (1.18)	2.90 (1.73)	**3.59** (0.83)
Nurses	3.29 (2.02)	4.55 (1.72)	4.55 (1.85)	3.71 (1.54)	**4.03** (1.22)
Psychology	3.44 (0.73	5.33 (1.53)	5.54 (1.46)	3.50 (1.77)	**4.45** (0.71)
Mean rating of control for each lecture	**2.98** (1.29)	**4.64** (1.60)	**4.58** (1.61)	**3.43** (1.60)	

Table 5.1

Test of the Significance of the difference in the **rating of control** between degree courses and of the interaction effect due to the relationship of degree course and experimental lecture rating .

Tests of between-subjects effects.

Source of Variation	SS	DF	MS	F	Sig of F
WITHIN+RESIDUAL	271.54	73	3.72		
COURSE	18.29	3	6.10	1.64	.188

Test of within subject effects.

Source of Variation	SS	DF	MS	F	Sig of F
WITHIN+RESIDUAL	352.04	178	1.61		
CONTROL RATING	215.59	3	71.86	44.70	.000
COURSE BY CONTROL RATING	12.98	9	1.44	.90	.528

KEY = CON rating of type of control in experimental lectures.
Critical Value = 3.86 p<=0.05

The results of the analysis show that there is a significant difference in the ratings of the control between the four experimental lectures (P<= 0.05). From table 5.1 of mean ratings of control it can be seen that lecturer controlled analytical lectures (rated as 2.98) and lecturer controlled holistic lectures (rated as 3.43) are rated significantly more lecture controlled than student controlled analytical lectures (rated as 4.64) and student controlled holistic lectures (rated as 4.58). It should be noted that based on these results the terms 'lecturer controlled' and 'student controlled' must be viewed as relative terms. This is because all results fall on the lecturer side of the rating scale mid point. However, there is a significant difference in the ratings and this is in line with the experimental design, indicating that the experiment was effectively implemented The second results of the analysis indicates that there is no significant difference in the rating of control for each of the four experimental lectures between the degree groups (P>0.05).

Mean rating of lecture style by degree course.

	Lecturer controlled - Analytical lecture	Student controlled - Holistic lecture	Student controlled - Analytical lecture	Lecturer controlled - Holistic lecture	Mean rating for lecture style for degree groups
Physiotherapy	4.00 (1.76)	6.28 (1.94)	4.86 (1.48)	5.56 (1.47)	**5.17** (1.12)
Statistics	3.78 (1.59)	5.32 (1.63)	4.70 (2.12)	6.37 (1.74)	**5.04** (0.86)
Nurses	3.47 (2.01)	5.26 (1.16)	5.12 (2.01)	5.95 (1.51)	**4.95** (1.16)
Psychology	3.54 (1.71)	5.87 (0.85)	4.37 (1.26)	5.88 (1.73)	**4.92** (0.92)
Mean rating of style for each lecture	**3.80** (1.74)	**5.80** (1.69)	**4.81** (1.73)	**5.87** (1.58)	

Table 5.2

Test of the Significance of the difference in the **rating of style** between degree courses and of the interaction effect due to the relationship of degree course and experimental lecture rating .

Tests of between-subjects effects.

Source of Variation	SS	DF	MS	F	Sig of F
WITHIN+RESIDUAL	322.40	73	4.42		
COURSE	3.10	3	1.03	.23	.872

Test of within subject effects.

WITHIN+RESIDUAL	493.86	178	2.26		
STYLE RATING	338.92	3	112.97	50.10	.000
COURSE BY STYLE RATING	23.49	9	2.61	1.16	.324

Critical Value = 3.86 p<=0.05

The analysis undertaken revealed that there was a significant difference in the rating of presentation style between the four experimental lectures ($p <= 0.001$). Lecturer controlled analytical (rated as 3.80) and student controlled analytical (rated as 4.81) lectures were viewed as being more analytical than lecturer controlled holistic (rated as 5.87) and student controlled holistic (rated as 5.80). As with the ratings of type of control it should be noted that the terms 'holistic' and 'analytical' should be viewed as relative terms, as all the mean style ratings are around the mid point of the rating scale. However, the results are in line with the original experimental design and it can be concluded that the different types of presentation styles were effectively implemented.

Conclusions.

From the above analysis it can be concluded that the experimental lectures were perceived in line with the experimental design. Type of control and presentation style was rated in accordance with the experimenters aims. This analysis also shows that there is no significant difference in the rating of the same type of lectures presented to the four lecture groups. This indicates that the presented style of the lectures was stable between the degree course groups.

The implications of these results are that the experimental design was successfully implemented and that four distinct lectures were presented to the student from the four degree courses. Also the results show that comparison between the lectures presented to the different degree courses would be a legitimate path of investigation.

Ratings of Lecture Handouts.

Mean rating of content of lecture handout by degree course

	Lecturer controlled - Analytical lecture	Student controlled - Holistic lecture	Student controlled - Analytical lecture	Lecturer controlled - Holistic lecture	Mean rating for lecture 'handout content' for degree groups
Physiotherapy	2.15 (0.36)	2.00 (0.34)	1.99 (0.06)	2.01 (0.27)	**2.04** (0.18)
Statistics	2.07 (0.23)	2.07 (0.23)	2.03 (0.15)	2.15 (0.37)	**2.08** (0.18)
Nurses	1.93 (0.30)	2.05 (0.43)	2.05 (0.63)	1.93 (0.27)	**1.99** (0.23)
Psychology	2.00 (0.53)	1.96 (0.41)	2.04 (0.45)	2.00 (0.00)	**2.00** (0.31)
Mean rating handout content for each lecture	**2.07** (0.34)	**2.02** (0.34)	**2.02** (0.31)	**2.03** (0.29)	

Table 5.3

Test of the Significance of the difference of **content of handouts** between degree courses and of the interaction effect due to the relationship of degree course and 'content of handouts' rating .

```
Tests of between-subjects effects.
 Source of Variation          SS       DF        MS          F  Sig of F
 WITHIN+RESIDUAL           12.03       73       .16
 COURSE                      .32        3       .11        .65       .583

Test of within - subject effects.
 Source of Variation          SS       DF        MS          F  Sig of F
 WITHIN+RESIDUAL           18.02      178       .08
 HOCS                        .01        3       .00        .04       .988
 COURSE BY HOC               .82        9       .09       1.11       .355
Key - HOCS = Rating of content of handouts
Critical Value = 3.86 p<=0.05
```

The statistical analysis shows that there is no significant difference in the rating of the content of lecture handouts between the four experimental lectures (F = 0.04) and also that there is no difference in the rating of lecture handouts' content between the four degree courses used within the study (F = 1.11). The between subject effects shows that there is no significant difference P<= 0.05 between the students ratings of the content of the handouts.

Mean rating of presentation of lecture handout by degree course

	Lecturer controlled - Analytical lecture	Student controlled - Holistic lecture	Student controlled - Analytical lecture	Lecturer controlled - Holistic lecture	Mean rating for lecture 'handout presentation' for degree groups
Physiotherapy	2.02 (0.53)	1.91 (0.51)	1.84 (0.49)	1.83 (0.54)	**1.90** (0.36)
Statistics	1.53 (0.60)	1.80 (0.74)	1.70 (0.48)	1.95 (0.60)	**1.75** (0.41)
Nurses	1.83 (0.61)	2.07 (0.84)	2.26 (0.74)	1.93 (0.47)	**2.02** (0.40)
Psychology	2.00 (0.76)	1.83 (0.44)	1.50 (0.44)	1.50 (0.53)	**1.71** (0.42)
Mean rating of handout presentation for each lecture	**1.86** (0.61)	**1.90** (0.63)	**1.84** (0.57)	**1.84** (0.55)	

Table 5.4

Test of the Significance of the difference of **rating of handout presentation** between degree courses and of the interaction effect due to the relationship of degree course and 'presentation of handout' rating .

Tests of between-subjects effects.

Source of Variation	SS	DF	MS	F	Sig of F
WITHIN+RESIDUAL	43.05	73	.59		
COURSE	3.51	3	1.17	1.98	.124

Test of between subject effects.

Source of Variation	SS	DF	MS	F	Sig of F
WITHIN+RESIDUAL	54.80	178	.25		
HOPS	.34	3	.11	.45	.717
COURSE BY HOPS	5.43	9	.60	2.41	.013

Key = HOPS - rating of handout presentation.

Critical Value = 3.86 p<=0.05

The analysis shows that there is no significant difference in the rating of lecture handout presentation between the four experimental lectures (P>0.05). There is however, a significant difference in the rating of lecture handout presentation between the four degree courses (P<=0.05). From table 5.4 of mean ratings it can be seen that nurses rate the presentation of lecture handouts least well. It should be noted however, that the difference, although statistically significant, is not practically significant as all degree courses rate the presentation of the handout as good or slightly better. Hence although this is a statistically significant result it should be noted that it does not represent a threat to the experimental design due to the degree groups' ratings of the presentation of lecture handouts. Between subjects effect show that there is no significant difference (P<= 0.05) between the students ratings of presentation of handouts.

Mean rating of integration of lecture handouts by degree course

	Lecturer controlled - Analytical lecture	Student controlled - Holistic lecture	Student controlled - Analytical lecture	Lecturer controlled - Holistic lecture	Mean rating for lecture 'handout integration' for degree groups
Physiotherapy	1.94 (0.58)	1.90 (0.56)	1.81 (0.39)	1.86 (0.53)	**1.88** (0.31)
Statistics	1.65 (0.75)	1.88 (0.95)	1.68 (0.59)	1.98 (0.73)	**1.80** (0.56)
Nurses	2.33 (1.16)	2.09 (0.76)	2.12 (0.38)	2.07 (0.27)	**2.15** (0.42)
Psychology	1.83 (0.64)	1.67 (0.47)	1.42 (0.39)	1.25 (0.46)	**1.54** (0.31)
Mean rating of the integration of handouts for each lecture	**1.93** (0.78)	**1.91** (0.71)	**1.79** (0.48)	**1.87** 0.59	

Table 5.5

Test of the Significance of the difference of **the rating of integration of lecture handouts** between degree courses and of the interaction effect due to the relationship of degree course and 'integration of handout ratings' .

Tests of between-subjects effects.

Source of Variation	SS	DF	MS	F	Sig of F
WITHIN+RESIDUAL	49.29	73	.68		
COURSE	8.40	3	2.80	2.14	.099

Test of between subject effects.

Source of Variation	SS	DF	MS	F	Sig of F
WITHIN+RESIDUAL	66.97	178	.31		
HOAS	1.25	3	.42	1.37	.254
COURSE BY HOAS	3.28	9	.36	1.19	.302

Key = HOA - integration of lecture handouts.

Critical Value = 3.86 p<=0.05

The analysis shows that there is no significant difference in the rating of the integration of lecture handouts between the experimental lectures (P>0.05). This Indicates that the integration is rated as equally effective in all experimental lectures. There is also no significant difference in the rating of integration of lecture handouts between the degree courses (P>0.05). The between subject effects indicates no significant difference between the students rating of the integration of handouts (P<= 0.05).

Mean rating of content of OHPs by course.

	Lecturer controlled - Analytical lecture	Student controlled - Holistic lecture	Student controlled - Analytical lecture	Lecturer controlled - Holistic lecture	Mean rating for lecture OHPs content for degree groups
Physiotherapy	2.07 (0.48)	2.03 (0.17)	2.03 (0.30)	2.09 (0.26)	**2.05** (0.17)
Statistics	2.08 (0.26)	2.12 (0.31)	2.07 (0.40)	2.28 (0.59)	**2.14** (0.32)
Nurses	2.12 (0.31)	2.02 (0.09)	2.21 (0.43)	2.07 (0.27)	**2.11** (0.22)
Psychology	2.25 (0.46)	2.25 (0.39)	2.21 (0.35)	2.13 (0.35)	**2.21** (0.25)
Mean rating of content of OHPs for each lecture	**2.10** (0.40)	**2.07** (0.24)	**2.09** (0.36)	**2.14** (0.38)	

Table 5.6

Test of the Significance of the difference of **rating of content of OHPs** between degree courses and of the interaction effect due to the relationship between degree courses and the rating of content of OHPs .

```
Tests of between-subjects effects.
 Source of Variation          SS      DF        MS         F  Sig of F
 WITHIN+RESIDUAL           15.91      73       .22
 COURSE                      .81       3       .27      1.23       .304

Test of within subject effects.
Source of Variation           SS      DF        MS         F  Sig of F
 WITHIN+RESIDUAL           19.88     179       .09
 COHP                        .04       3       .01       .15       .927
 COURSE BY COHP              .86       9       .10      1.06       .395
Key = COHP - Content of OHP rating
Critical value = 3.86 p<=0.05
```

The analysis for rating of content between the experimental lectures OHPs indicates that there is no significant difference (P>0.05) in how the students rated them. No significant difference was also recorded (P>0.05) for between courses rating of content of lecture, meaning that no one degree group received OHPs which significantly differed in there content when compared with any other degree group. The between subject effect reveals no significant difference in the rating of content of OHPs between the student participants (P<= 0.05).

Mean rating of presentation of OHPs by degree course.

	Lecturer controlled - Analytical lecture	Student controlled - Holistic lecture	Student controlled - Analytical lecture	Lecturer controlled - Holistic lecture	Mean rating for lecture OHPs presentation for degree groups
Physiotherapy	2.50 (0.70)	2.01 (0.77)	2.18 (0.60)	2.06 (0.49)	**2.18** (0.38)
Statistics	1.75 (0.44)	2.03 (0.83)	1.98 (0.55)	2.07 (0.23)	**1.96** (0.40)
Nurses	1.93 (0.27)	1.81 (0.45)	2.12 (0.78)	2.10 (0.27)	**1.99** (0.27)
Psychology	2.13 (0.64)	2.08 (0.61)	2.17 (0.73)	2.29 (0.45)	**2.17** (0.47)
Mean rating of presentation of OHPs for each lecture	**2.16** (0.65)	**1.99** (0.72)	**2.12** (0.63)	**2.09** (0.40)	

Table 5.7

Test of the Significance of the difference of the **rating of OHP presentation** between degree courses and of the interaction effect due to the relationship of degree course and rating of OHP presentation.

Tests of between-subjects effects.

Source of Variation	SS	DF	MS	F	Sig of F
WITHIN+RESIDUAL	41.20	73	.56		
COURSE	3.44	3	1.15	2.03	.117

Test of within subject effects.

Source of Variation	SS	DF	MS	F	Sig of F
WITHIN+RESIDUAL	62.50	178	.29		
POHP	.73	3	.24	.85	.468
COURSE BY POHP	6.08	9	.68	2.37	.014

Key = POHP - Rating of OHP presentation.
Critical Value = 3.86 p<=0.05

The results of the analysis of OHP presentation indicate that there is a significant difference in the rating of presentation of the OHPs between the four courses (P>0.05), see table 5.6. No significant difference was recorded for the ratings of OHP presentation (P<= 0.05). Between subject analysis indicates that there is no significant difference in the rating of presentation of OHPs between the student participants (P<0.05).

Mean integration rating of OHPs by degree course.

	Lecturer controlled - Analytical lecture	Student controlled - Holistic lecture	Student controlled - Analytical lecture	Lecturer controlled - Holistic lecture	Mean rating for lecture OHPs integration for degree groups
Physiotherapy	2.15 (0.45)	1.71 (0.46)	2.09 (0.70)	2.05 (0.41)	**2.00** (0.31)
Statistics	1.62 (0.52)	1.97 (0.81)	2.03 (0.72)	2.07 (0.61)	**1.92** (0.49)
Nurses	2.12 (0.38)	1.86 (0.50)	2.26 (0.84)	1.93 (0.27)	**2.04** (0.32)
Psychology	2.13 (0.83)	2.29 (0.58)	2.04 (0.72)	1.88 (0.83)	**2.08** (0.61)
Mean rating of integration of OHPs for each lecture	**2.00** (0.55)	**1.87** (0.60)	**2.10** (0.70)	**2.01** (0.50)	

Table 5.8

Test of the Significance of the difference of **rating of interaction of OHP with lecture** between degree courses and of the interaction effect due to the relationship of degree course and rating of interaction of OHP with lecture.

```
Tests of between-subjects effects.
 Source of Variation          SS      DF        MS          F  Sig of F
 WITHIN+RESIDUAL           30.34      72       .42
 COURSE                     1.32       3       .44       1.05       .377

Tests of within - subject effects.
Source of Variation           SS      DF        MS          F  Sig of F
 WITHIN+RESIDUAL           52.16     178       .24
 OHPA                        .77       3       .26       1.08       .358
 COURSE BY OHPA             6.54       9       .73       3.05       .002
Key = AOHP - Rating of integration of OHPs
Critical value = 3.86 p<=0.05
```

The analysis shows that there is no significant difference in the rating of the integration of OHPs between the four lecture styles (P>0.05). No one lecture had a more effectively integrated OHP than any of the other lectures. The analysis also revealed that there was a significant difference in the rating of integration of OHPs between the four degree courses (P<= 0.05) with statistics students rating the integration as most effective (rated as 1.92). It should be noted however, that there is no substantive difference in the rating of the integration of the OHPs between the four degree courses, as all of the degree courses rate the integration as approximately 'Working well together'. So although there is a statistical difference this does not manifest itself as a substantive difference in the ratings such that it would threaten the research design. The between subject effect shows no significant difference P<= 0.05.

Conclusions from the analysis of Handouts and OHPs.

The overwhelming results from the analysis of the ratings of lecture OHPs and Handouts were that there was no significant differences in their ratings across lectures between degree courses. No results showed a significant difference between the ratings of handouts or OHPs between the participants. However, three significant differences were found in the analysis of Integration of OHPs between degree courses, presentation of OHPs between degree courses and presentation of handouts between degree courses. Although these results did show a significant difference this difference in both cases did not manifest it self as a substantive practical difference in the rating. That is in absolute terms these results do pose a threat for the experimental design of this study, however, it is argued that this threat is not serious and does not fundamentally threaten the research design. This conclusion is based on the following points:

- The significance in all cases is between good and excellent rating and so the overall emphasis of all students is positive and not across a positive negative rating boundary.
- The significant findings refer to only a small sub-section of the lecture, either the handouts and the OHPs, not the overall reactions to the lectures.
- The overall ratings of the lectures (pg 154) show no significant differences, indicating that the impact of these 'significant' results is not such to influence the overall rating of the lectures.

Based on these three points it is argued that the experimental design has not been threatened to a significant extent. The implications of these results are that no presented lecture was unduly advantaged or disadvantaged by the quality of their associated handouts or OHPs. This conclusions means that any differences in the ratings of the experimental lectures is in response to the lecture style and not to an internal features of the lecture.

Analysis of experimental hypothesis.

The analysis to this point has served to substantiate the effectiveness of the experimental procedure the experimental design of this study. It has not illuminated the experimental hypothesis. The analysis needed to do this is undertaken in the following section. The analysis of the implementation comprised of two-way ANOVAs using lectures by degree courses and the required response. This was because of the design of the study meant that the experimental lectures were presented separately to each degree course and this it was imperative that the analysis was undertaken to discover if the lectures presented to the different degree courses were comparable. The analysis showed no significant difference in the relevant features of the lectures presented to the degree courses. This provides reasonable evidence to collapse the four data sets into a single set and use this to study learning styles. Hence all four lectures of a single type will be treated as a single lecture style unit. This collapse of the data set allows the following analysis to look at learning styles across the four degree courses.

The learning styles ratings of the perceived effect on learning of the experimental lectures.

Mean rating of effects of lecture control by learning style.

	Lecturer controlled - Analytical lecture	Student controlled - Holistic lecture	Student controlled - Analytical lecture	Lecturer controlled - Holistic lecture	Mean rating of effect lecture control for learning styles
Diverger	2.42 (0.79)	2.19 (0.70)	2.31 (1.51)	2.28 (0.75)	**2.28** (0.48)
Assimilator	2.85 (0.90)	1.92 (0.51)	2.23 (0.73)	2.20 (0.81)	**2.30** (0.41)
Converger	2.20 (0.65)	2.33 (0.72)	2.22 (0.91)	2.27 (1.16)	**2.26** (0.52)
Accommodator	2.24 (0.78)	2.20 (0.77)	2.00 (0.33)	2.27 (0.70)	**2.18** (0.43)
Style Five	2.44 (0.52)	2.36 (0.79)	2.17 (0.57)	2.61 (0.95)	**2.39** (0.47)
Mean rating of effect of control for each lecture	**2.42** (0.73)	**2.22** (0.72)	**2.18** (0.83)	**2.35** (0.90)	

Table 5.9

Test of the Significance of the difference of the **rating of the effect of lecture control** type between learning styles, and of the interaction effect due to the relationship of learning style and rating of the effect lecture control type.

```
Tests of between-subjects effects.
 Source of Variation          SS      DF        MS          F  Sig of F
 WITHIN+RESIDUAL           69.58      72       .97
 LS                         1.78       4       .45        .46       .764

Test of within subject effects.
Source of Variation           SS      DF        MS          F  Sig of F
 WITHIN+RESIDUAL          114.94     175       .53
 CONE                       2.89       3       .96       1.81       .147
 LS BY CONE                 6.31      12       .53        .99       .461
Key = CONE - rating of the effect of control.
Critical value = 3.49 p<=0.05
```

The analysis shows that there is no significant difference in the rating of effect of lecture control between the four experimental lectures (P>0.05), indicating that all types of lecture control were viewed as being equally effective. The between subject indicates no significant difference (p,= 0.05) in the rating of the effect of control between student participants.

The analysis also indicates that there is no significant difference in the rating of the effect of control between the five learning styles (P>0.05). This result runs against the basic hypothesis of this study that attuned lectures will be perceived more positively than the non attuned lectures. Table 5.9 of means indicates that all learning styles rated the effect of the types of control positively, denoting that students from each learning style perceived they learnt equally well in the non attuned control lectures as attuned control lectures.

Mean rating of the perceived effects of lecture style by learning style.

	Lecturer controlled - Analytical lecture	Student controlled - Holistic lecture	Student controlled - Analytical lecture	Lecturer controlled - Holistic lecture	Mean rating of effect lecture style for learning styles
Diverger	2.25 (1.06)	2.39 (0.66)	1.97 (0.61)	2.11 (0.64)	**2.18** (0.57)
Assimilator	2.28 (0.51)	1.90 (0.34)	1.87 (0.57)	2.00 (0.41)	**2.01** (0.29)
Converger	1.95 (0.49)	1.84 (0.35)	1.78 (0.43)	2.13 (0.74)	**1.93** (0.27)
Accommodator	1.80 (0.56)	2.00 (0.76)	1.96 (0.60)	2.22 (0.74)	**1.99** (0.45)
Style Five	1.77 (0.81)	2.27 (0.63)	2.06 (0.60)	2.09 (0.74)	**2.05** (0.38)
Mean rating of effect of style for each lecture	**1.97** (0.73)	**2.09** (0.60)	**1.94** (0.56)	**2.11** (0.67)	

Table 5.10

Test of the Significance of the difference of the **rating of effect of lecture style** between learning styles and of the interaction effect due to the relationship of learning style and rating of lecture style.

```
Tests of between-subjects effects.
 Source of Variation          SS      DF        MS         F  Sig of F
 WITHIN+RESIDUAL           45.68      72       .63
 LS                         1.83       4       .46       .72       .579

Tests of within subject effects.
Source of Variation           SS      DF        MS         F  Sig of F
 WITHIN+RESIDUAL           72.11     175       .33
 STYE                       1.47       3       .49      1.47       .223
 LS BY STYE                 6.13      12       .51      1.53       .115
Key =  STYE - rating of the effect of style.
       LS - Learning Style.
       Critical value = 3.49 p<=0.05
```

This analysis shows that there is no significant difference in the rating of the effect of the presentation style of the four experimental lectures (P>0.05), indicating that the effect of presentation style between the four experimental lectures was rated equally well by participants. The results also indicate that there is no significant difference in the rating of the effect of presentation style between the five learning styles (P>0.05). This result opposes against the experimental hypothesis that attuned lectures will be rated more positively than non attuned lectures. What is interesting to note is that the learning styles were not only not significantly different in their ratings but the ratings themselves viewed learning as positive or better (a rating of 2 or greater). Thus students perceive themselves to be gaining from all lecture presentation styles. The between subject analysis reveals no significant difference (P<= 0.05)

Mean overall rating of experimental lectures by learning style.

	Lecturer controlled - Analytical lecture	Student controlled - Holistic lecture	Student controlled - Analytical lecture	Lecturer controlled - Holistic lecture	Mean overall of lecture for learning styles
Diverger	2.17 (0.66)	2.14 (1.12)	1.75 (0.64)	1.83 (0.41)	**1.97** (0.49)
Assimilator	2.38 (0.67)	1.87 (0.52)	1.82 (0.55)	1.82 (0.40)	**1.97** (0.35)
Converger	1.84 (0.55)	1.62 (0.49)	1.80 (0.56)	1.87 (0.64)	**1.78** (0.39)
Accommodator	2.00 (0.65)	2.07 (0.70)	1.96 (0.47)	2.20 (0.53)	**2.06** (0.40)
Style Five	1.85 (0.56)	1.86 (0.64)	1.88 (0.57)	1.82 (0.55)	**1.85** (0.35)
Mean overall rating each lecture	**2.02** (0.66)	**1.90** (0.71)	**1.85** (0.55)	**1.90** (0.53)	

Table 5.11

Test of the Significance of the difference of the **overall rating of the lectures** between learning styles and of the interaction effect due to the relationship of learning style and the overall rating of the lectures.

```
Tests of between-subjects effects.
 Source of Variation          SS       DF        MS          F  Sig of F
 WITHIN+RESIDUAL           44.22       72       .61
 LS                         2.91        4       .73       1.18       .325

Tests of within - subject effects.
Source of Variation           SS       DF        MS          F  Sig of F
 WITHIN+RESIDUAL           63.84      175       .30
 OVERALL                    1.69        3       .56       1.90       .130
 LS BY OVERALL              4.49       12       .37       1.27       .240
Key =  OVERALL - Overall rating of the experimental lectures.
       Critical Value = 3.49 p<=0.05
```

The analysis shows that there is no significant difference in the overall rating of the experimental lectures by the learning styles (P>0.05). The analysis also shows that there is no significant difference in the overall rating of the four lectures. From the above table of mean ratings it can be seen that all lectures gain an overall rating of approximately 2, which means that the students perceived that all lectures had a 'positive' effect on their learning. The between subject analysis indicates that there is no significant difference (P<= 0.05) in the rating of the effect of lecture style between the participants.

Conclusions from analysis of the perceived effect of lectures on learning by learning styles.

The analysis of the effect of the lectures was carried out in three stages, firstly looking at the two attuned features, control and presentation style, and then at the overall effect of the lecture. In none of these stages was there a significant difference in the ratings of the effect of the lecture on learning noted. This means that the null hypothesis that learning style groups will rate attuned lectures no more positively than non-attuned lectures cannot be rejected.

What is also noteworthy from these results is that all the lecture types received a positive ratings from the student participants. That is, it is not simply the case that the attunement is not in line with the experimental design but rather that students indicate that they perceive that they are able to 'positively' learn in an array of lecture styles. It is important that they report that they positively learn, as this indicates that they are perceiving themselves to be coping in the various lectures but perceive themselves as engaging with them effectively and learning well.

Further analysis.

The analysis has failed to show a significant difference between the ratings of the perceived effect of the various experimental lectures between the five learning styles. It was decided it was necessary to carryout further analysis to verify that the students of different learning styles themselves rated the lectures as significantly different from each other.

Mean rating of lecture control by learning style.

	Lecturer controlled - Analytical lecture	Student controlled - Holistic lecture	Student controlled - Analytical lecture	Lecturer controlled - Holistic lecture	Mean rating of lecture control for learning styles
Diverger	3.42	4.72	4.97	3.61	**4.18**
	(1.98)	(1.61)	(1.94)	(1.73)	(1.46)
Assimilator	2.69	4.13	5.31	3.87	**4.00**
	(0.85)	(1.11)	(1.80)	(1.87)	(0.98)
Converger	3.46	4.55	4.18	3.20	**3.85**
	(0.92)	(1.90)	(1.14)	(1.52)	(0.76)
Accommodator	2.53	5.00	3.87	2.98	**3.59**
	(1.13)	(1.46)	(1.46)	(1.26)	(0.78)
Style Five	2.88	4.73	4.68	3.53	3.95
	(1.29)	(1.75)	(1.56)	(1.67)	(0.93)
Mean rating of control for each lecture	**2.98**	**4.64**	**4.58**	**3.43**	
	(1.29)	(1.60)	(1.61)	(1.60)	

Table 5.12

Test of the Significance of the difference of the **rating of lecture control** type between learning styles and of the interaction effect due to the relationship of learning style and rating of lecture control type.

Tests of between-subjects effects.

Source of Variation	SS	DF	MS	F	Sig of F
WITHIN+RESIDUAL	279.53	72	3.88		
LS	10.30	4	2.58	.66	.619

Test of within subject effects.

Source of Variation	SS	DF	MS	F	Sig of F
WITHIN+RESIDUAL	392.18	175	1.82		
CON	150.99	3	50.33	27.72	.000
LS BY CON	31.46	12	2.62	1.44	.148

Key = CON - Rating of control of lectures.
LS - Learning style
Critical Value = 3.49 p<=0.05

The analysis shows that there is a significant difference in the rating of control between the four lectures (P<= 0.001). From the above table of mean ratings of control for the four experimental lectures it can be seen that lecture controlled analytical lectures (rated as 2.98) and lecturer controlled holistic lectures (rated as 3.43) are rated more lecturer controlled than student controlled holistic lecture (rated as 4.64) and student controlled analytical lecture (rated as 4.58). It should be noted however, that these ratings should be viewed as relatively student controlled and lecturer controlled, as none of the mean ratings of control actually pass the mid point on the rating scale. Nonetheless there is a significant difference in the ratings of the lecture control in

line with the experimental design. The between subject analysis revealed that there was no significant difference (P<= 0.05)between the rating of the type of control between the participants.
This analysis also shows that there is no significant difference in the rating of control between the five learning styles, students of all learning styles rate the control of the lectures in line with the experimental design but not significantly different from each other.

Mean rating of lecture presentation style by learning style.

	Lecturer controlled - Analytical lecture	Student controlled - Holistic lecture	Student controlled - Analytical lecture	Lecturer controlled - Holistic lecture	Mean rating lecture style for learning styles
Diverger	3.75 (1.71)	5.53 (1.16)	5.69 (1.65)	5.80 (1.77)	**5.19** (0.94)
Assimilator	3.82 (1.83)	5.59 (1.87)	5.26 (2.17)	5.77 (1.40)	**5.11** (1.25)
Converger	4.31 (1.89)	5.44 (1.70)	4.35 (1.22)	6.80 (1.47)	**5.23** (1.13)
Accommodator	3.67 (1.80)	5.80 (1.93)	3.93 (1.14)	4.96 (1.79)	**4.59** (0.94)
Style Five	3.56 (1.63)	6.32 (1.67)	4.98 (1.87)	5.97 (1.21)	**5.21** (0.92)
Mean rating of style for each lecture	**3.80** (1.74)	**5.80** (1.69)	**4.81** (1.73)	**5.87** (1.58)	

Table 5.13

Test of the Significance of the difference of the **rating of lecture style** between learning styles and of the interaction effect due to the relationship of learning style and rating of lecture style.

Tests of between-subjects effects.

Source of Variation	SS	DF	MS	F	Sig of F
WITHIN+RESIDUAL	307.62	72	4.27		
LS	17.88	4	4.47	1.05	.389

Test of between subject effects.

Source of Variation	SS	DF	MS	F	Sig of F
WITHIN+RESIDUAL	487.50	175	2.26		
STY	197.31	3	65.77	29.14	.000
LS BY STY	50.09	12	4.17	1.85	.042

Key = STY - rating of lecture style.
LS - learning style.
Critical Value = 3.49 p<=0.05

The analysis shows that there is a significant difference in the rating of lecture presentation style between the four experimental lectures. The above mean table 5.13 indicates that lecturer

controlled analytical lectures (rated as 3.80) and student controlled analytical lectures (rated as 4.81) are rated more analytical than student controlled holistic lectures (rated as 5.80) and lecturer controlled holistic lectures (rated as 5.87). This is in line with the experimental design. This indicates that the experiment was successfully implemented. The between subject analysis indicates that there is no significant difference ($P <= 0.05$) between the participants rating of the style of the lectures.
The analysis also shows that there is a significant difference in the mean rating of presentation style by the five learning styles. Accommodators give a mean rating of style (4.59) which is lower than the other learning styles. This result is difficult to interpret in terms of this experiment, as it shows that accommodators overall rating is more conservative than the other learning styles. The mean results for the rating of each experimental lecture's presentation style is still in line with the overall design of the study (Lectures rated as 3.67, 4.80, 3.93, 4.96, respectively). This result therefore does not provide any support this study's general hypothesis.

Conclusions from further analysis.

This analysis has revealed that the rating of both control and presentation style by learning style was in line with the experimental design. The learning style groups therefore did perceive the lectures to be different and this difference was in line with the experimental design. This leads to the conclusion that learning style groups perceive that they learn equally well in all lectures.

There is however, one anomaly within these results in that there is a significant result reported in the rating of the mean style of the experimental lectures between the learning styles. This indicates that not all the learning styles were ratings of the experimental lectures were comparable. From the above table of mean ratings of style by learning styles it can be seen that the accommodator learning style has the smallest mean rating of style (rated as 4.59).However, although this may be significantly less that other learning style mean ratings, the difference relates to the extent to which the styles were rated not to the direction of the rating. That is the accomodator learning style group are more conservative in their ratings but follow the same basic trend as the other learning style groups.

Final conclusions from the analysis.

- The lectures were perceived in line with the experimental design, indicating that the study was effectively implemented.

- The ratings of the OHPs and handouts between the experimental lectures showed no significant difference in the rating of these internal features. This indicates that no advantage or disadvantage was created by any lectures OHPs or handouts.
- The learning style groups did not rate their attuned lectures any more highly than the non attuned lectures.
- All learning styles perceived that they 'positively' learnt.

CHAPTER SIX : SUPPORT OF THE DESIGN OF THE STUDY.

Discussion points in this chapter.

- The lack of significant results - what implications does this have for the study?
- The students perception of learning in lectures - were the lectures perceived in line with the dominant negative image of lectures.
- Rejection of other explanations of lack of significant results - discussion of other possible reasons why the results were not as expected.

The lack of significant difference in the results.

Based on the aims and objectives of this study it was expected that there would be a significant difference between the perception of learning between the experimental lectures which were attuned to learning styles and those which were not attuned, this was not the case. The overwhelming result of the study was that various groups failed to exhibit a significant difference in their perception of learning within the experimental lectures. The most common result gained is no significant difference in response. This indicates that the perceptions of lectures and the ratings of lectures are fairly uniform between the degree groups and within the individuals. In light of these results the notion of attunement becomes irrelevant as the learning styles failed to rate specific lectures more positively than others, resulting in a situation where the students report that they learnt well in all lectures. The results indicate that attunement would have no benefits for the learning styles.

The lack of significant differences in perception of learning within various lectures radically shifts the studies emphasis but does not reject the study as invalid (evidence that the students perceived the lectures as different is cited above). Implicitly within the attuning of lectures is a focus on the needs of the students and the desire to fulfil those needs by designing an appropriate environment for those learners needs. The results indicate that the students perceive that they are able to positively learn in a variety of situations and their learning needs can be fulfil in various ways. It will be argued within this

discussion that these results have two major consequences. Firstly students are *flexible* in their approach to learning and are able to *shift in their approach* in order to accommodate the properties of various learning opportunities. Secondly it implies that the focus of research should be upon the *method and not the students*. This is not an absolute rejection of the needs of the student but rather an indication that due to the students ability to shift their position the most productive way of approaching improving learning is by optimising the methods used. This is a radical departure from the original objectives of the study and indeed rejects the notion of attunement in favour of well designed lectures which will facilitate learning for all.

Summary of the lack of significant difference.

The lack of significant difference in the perception of learning in lectures implies:

- Kolb's discrete learning styles do not manifest them in students reports of perceived learning.
- Various types of lectures can be a positive learning experience for students.

Students perception of learning in lectures.

Overwhelmingly the lectures presentation style and control type were rated as enhancing or strongly enhancing learning (rated as above two on the scale). This indicates that the students perceived that they learnt well in the lecture no matter what the actual style of presentation and control was. This once again contradicts the expectations of this study, as it was expected (based on Kolb's association between approach to learning and learning styles) that students would positively perceive learning in attuned lectures and more negatively perceive lectures in non-attuned lectures. If it is accepted that the lectures were significantly different from each other this adds further evidence for the students flexibility, and that they are able to gain from different types of presentation. The argument can be pushed further than this, for not only did the student perceive that they learnt but that the lecture had an enhancing or strongly enhancing effect on their learning. The students could have rated the lecture as having 'no effect' on their learning, that is there learning was independent of the lecture. This option was infrequently taken by students and the lecture was more commonly rated as enhancing learning, despite the variety of lectures used.

The implications of these results for lectures.

The students perception of lectures and learning is far more positive than the frequent presentation of the lecture as a weak aid to learning, a mode of delivery that should be reduced or even abandoned in favour of more interactive approaches to teaching. Frequently the research on lectures has been based on lecturers perceptions of lectures and performance tests (see Dunkin, 1983, for review). It is reasonable to argue that the lecture as perceived by those who delivery them will be different from the perception of lectures by those who experience them. There are a number of areas which can be cited as reasons why the lecturers perception of lectures' may differ from the students. A major difference is the fact that the lecturer has to physically present the lecture, stand

before the lecture group and hold their attention. Bergman (1983) noted that this "leaves the instructor exposed" (pg 51). without doubt the performance of lecturing places the lecturer in a vulnerable position and open to criticism and even ridicule from the lecture group. This fundamental threat within lecturing could cause the lecturer to establish a negative image of the lecture technique. Added to this is the knowledge that lecturing is not easy, it is a skilled and difficult form of presentation, although it may not be more difficult than preparing good distance learning packages, it does establish an environment where mistakes happen in 'real time' and the consequences of mistakes must be faced within the lecture. Fink (1989) highlight some of the demands that are made of a lecturer. He noted that lecturers have to be able to gain eye contact, use humour, present information in a dramatic way, all with the goal of making the students listen in the hope that, 'the audience feels drawn in' (pg 19). All this must be done on top of selecting appropriate information for the lecture. In light of this the lecturer is bound to have dramatically different perceptions of the lecture. This is not to say it is purely the difficulty in presenting of lectures which causes the negative images of lectures to dominate the literature. Positive reports of lecturing can be found which contradict the simple argument that lecturing's implicit difficulty establishes its negative image within the literature (see Valenta, 1974; Murray and Murray, 1992; Habeshaw, 1995). The negative image is not solely established around lecturer perceptions of the lecture, empirical evidence is cited to support the argument that lectures are an educational method with no special abilities. Gibbs (1982), reporting on a plethora of studies which investigated the effectiveness of the lecture in comparison with various other teaching method noted that;

> "The overwhelming outcome of all this work is that there is no significant difference between lecturing and a whole host of other teaching methods ... There are indications that lecturing are less effective, even at imparting information, than certain methods, notably unsupervised reading" (pg 8).

Based on Gibbs' research the lecture appears to perform no better than many other forms of teaching, when considered in line with the difficulty and vulnerability associated with lecturing the future of lectures is bleak.

The research presented has focused on two main areas, those being lecturers perceptions and reactions to lectures, and assessment of the 'products' of lectures. That is the assessment of the effectiveness of lectures focused on products but not the process of learning. The use of an exam or test scores to assess lecturing was criticised by McKeachie (1990).

> "The typical use of final course examinations, for which students have crammed, as the primary outcome measure is a major reason for the small effects often found in research on college teaching" (1990, pg 191).

McKeachie is arguing that test performance can only ever possibly assess a small part of what is gained within any lecturing experience, yet this is the dominant mode of assessment of learning in connection with a lecturing method. Hence although the lecture may not perform any better than many other teaching techniques at establishing a measurable knowledge base it may give the students knowledge of the process which is learning. Certainly this is the thesis put forward by Valenta (1974) in "To see a chemist thinking", here Valenta argues that one of the main benefits of a lecture could be that the students experience a person engaging with a problem and working with it. Valenta (1974) presented the lecture as:

> "[An] opportunity for the student to participate, personally and fully in the thinking process of that discipline" (pg 55).

If this is the case then such a benefit would be ignored by the assessment of accumulated knowledge. If students concur with Valenta that a lecture is an opportunity for the "development of curiosity and creativity" (pg 55), then the positive rating of lectures found within this study can be substantiated from this

perspective. A perspective which will have been ignored by product focused assessment of lectures performance.

Summary of learning in lectures results.

- The students perceive the lecture has having a positive effect on learning.
- The students fail to rate the various lecture types as having different effects on their perception of learning.
- Earlier research may have undervalued the positive effect of lectures.
    a. Research predominately based on lecturers' perceptions.
    b. Lectures were assessed based on the examinable outcomes alone, this may have ignored insight students gained into 'the learning process'.

Implications of the results for Kolb.

The experimental lectures were designed to appeal to the strengths of specific learning styles and by omission would fail to facilitate or even inhibit learning styles which they were not attuned to. It would be expected therefore that the rating of the lectures would vary between the learning styles and the associated degree course. This was not the case as there was no significant difference in the rating of lectures between the learning styles (see pg 228). Added to this is the fact that the learning styles rated the lectures as enhancing their learning in all cases and so casts doubt on Kolb's theoretical position. If the lecture were universally criticised by all four learning styles, this would reflect the poorly on the lectures but need not be perceived as impacting on the learning styles. For as the lecture failed to really engage with learning the learning styles were unable to be expressed. However, the lectures were rated as enhancing or strongly enhancing students learning, hence the lectures were perceived as a positive learning experience which provided the students with opportunities to express their learning styles. Yet the learning styles failed to rate attuned lectures more

positively or indeed differently from any other lecture, indicating that all four learning styles were able to positively learn from all four lectures. The differences which Kolb presents for the four learning styles did not impact on their perception of learning in lectures, despite the fact that each lecture was attuned to a specific learning style. The lack of significant difference can be centred on one of three major possibilities.

- The lectures were not attuned to the learning styles.
- The learning styles are in some way able to accommodate differences in the learning environment, by flexing or shifting emphasis in some way.
- A combination of the two.

Summary of implications for Kolb.

- Learning styles do not rate attuned lectures more positively than non-attuned lectures.
- All learning styles report that they have learnt well in all lectures.
- It will be argued here that these results are a product of flexibility of learning styles.

Rejection of other explanations of lack of significant difference.

Support for the design of attunement.

The design of the attunement of lectures is based directly on Kolb's definition of learning styles. These were used to create a thumb nail sketch of the orientation of the learning styles. As the study was limited in contact time available with students, characteristic features of the learning styles were identified, orientation towards control and orientation towards processing. (see design of experimental lectures - appendix 3). This information had to then be mapped onto features of lectures which could be varied within the study. The resulting attunements were as follows:

	Style of lecture	Attuned for .
1	Student control - Analytical presentation.	Convergent learning style.
2	Lecturer control - Holistic presentation.	Divergent learning style.
3	Lecturer control - Analytical presentation.	Assimilator learning style.
4	Student control - Holistic presentation.	Accommodator learning style.

Table 6.1 Showing the attunement of lectures to learning styles.

As these attunements come directly from Kolb's own definitions of learning styles it is felt that the attunements although perhaps not perfectly representing each learning style emphasises the dominant characteristics of that learning style. For example the Accommodator learning styles was attuned based on their ability to 'solve problems in an intuitive trial and error manner' which was represented within the holistic presentation style with its focus on real world problems. Accommodators were presented by Kolb as actively engaging with the learning 'doing things, in carrying out plans and tasks and getting involved in new experiences' this was facilitated by the student control, which allowed Accommodators to engage directly via questions and group work sessions.

As the attunements of lectures are drawn so closely from the definitions of lectures it seems reasonable to conclude that they represent differences in approaches to lectures based upon the definitions of learning styles presented by Kolb.

Another possible interpretation of the lack of significant results between learning styles is that the situation shaped the response of the students to a greater extent than the learning styles, that is the lecture was dominant over the learning style. Kolb refers to the role of immediate environment in the development of learning styles and notes the importance of these in shaping our approach to learning.

> "At the other end of the continuum are those increasingly specific environmental demands stemming from our career choice, our current job, and the specific tasks that face us. These forces exert a somewhat stronger but more situational specific influence on the learning styles we adopt" (pg 1984, pg 98).

Although the role of immediate environment cannot be ignored it has to be recognised the learning style should in some way shape a students approach even though the specific environment may shift the overall emphasis of the style. That is a lecture format may cause a learner to adopt an assimilative approach but this does not mean that relative to the whole group convergers are no longer emphasise a convergent approach and so on. If this were not the case learning styles would best be assigned to environments and not learners themselves. As the person would merely reflect the environment and not express anything which characterised the self. Hence the lecture may influence the students learning style but it should not cause the learning styles to be lost completely.

Differences in the lecture were not important within learning.

The differences in the lectures were designed to reflect the learning styles, that is they were not random changes in the lectures but ones which reflected the abilities of Kolb's learning styles (See Appendix 3 - design of experimental lectures). Hence based on the evidence presented by Kolb, the differences should represent important variations in approach to learning, rather than superficial changes in design aspects which are not important features of the learning styles approach to learning. The differences in the lectures were identified by the students and these differences were designed to reflect the central needs of different learning styles and as such should according to Kolb be important within learning.

The Hawthorne effect.

Dunkin 1983 cites the Hawthorne effect as the source of considerable problems for any research investigating various teaching techniques.

> "... the Hawthorne effect, where emotional reactions of staff and students involved with novel methods can cloud the genuine effects of the method" (pg 65).

The problem of the 'novel' lecture was considered within the design of the study, this was mainly due to the ethical issues of using real degree courses and so having to present information in ways which were open and accessible to the students, so not inhibiting their performance on the degree course. This ruled out the use of radical and extreme variations of lecture presentation and focused the research more closely on internal manipulations of the 'traditional' lecture. This had the result of not presenting to the students extremely novel lectures, which may be responded to based on the fact they are different rather than how they related the information. There is still a chance of the Hawthorne effect but this is

drastically reduced as the overall format of the lecture remains that which is commonly used within higher education.

Social desirability in responses to lectures.

The positive responses could be cited as being a product of the students wishing to present a positive image of their learning abilities and so the responses reflect the students desire to appear to be good learners. Essentially this implies that the students are presenting socially desirable answers to the questions about the lectures which place them in a good light. Other responses from the questionnaires cast serious doubt on this argument. Firstly the students were able to correctly identify the different types of lectures indicating that they were attending to the questions in a thoughtful manner. Secondly not all responses were positive, if responses to handouts and overheads are studied it is apparent these are not all rated as having a beneficial effect (e.g. degree course and ratings of handouts). If the students were concerned with purely presenting a positive self image in the learning environment it would seem reasonable to conclude that they would do this across the board and not selectively for certain items on the questionnaire. If this argument is accept then the positive responses to the lectures reflect personal opinions about the lecture and not an unthinking responses based on the desire to present a positive self image.

General confounding issues within student responses.

Other possible reasons for the overwhelm positive response to the lectures were presented by Dunkin (1983) who put forward the argument that results gained from studies of teaching methods and students reactions were open to many biasing effects.

> " There are also effects of eliminating the confounding effects of teacher personality, of avoiding biased sampling, of minimising artificiality, of choosing appropriate statistical methods, and allowing for aptitude-treatment of interactions whereby a given method may suit some types of students more than others" (pg 65).

Some of these possible sources of error are not appropriate to this study, such as allowing for 'aptitude-treatment' as the aim of the research was to investigate what effectively was the aptitude of the various learning styles within the four experimental lectures. Hence aptitude was a central part of the research and not a confounding variable. The problem around sampling bias was accommodated within the study by gaining students from four degree disciplines which Kolb argues represent different learning styles. This established the greatest possibility of gaining a broad cross section of students learning styles. The desired cross section of learning styles was achieved within the total research population. As far as any other form of bias is concerned in the age or gender of the population this was secondary to the desire to gain a broad cross of learning styles. However, after the degree group was selected the whole of this group were used within the study, indicating that any idiosyncrasies of the group were as much a product of the population as the sampling, for example the age of the students is a truncated variable within the analysis, yet this is not as a result of sampling bias but rather reflects a characteristic of the group being predominately 18 to 22 year olds. As the data generated was relatively uncomplicated it could be analysed using two way ANOVA's, t-tests and sign tests in accordance with good practice, choosing appropriate statistical procedures was not an issue for the research. 'Teaching personality' was recognised as a possible confounding variable, which could directly effect the students perception of the lecture for this reason this research used only one teacher for all the lectures. With the teacher's personal characteristics held constant any differences in the students perceptions of lectures would be due to the lectures themselves and not a product of the confounding effect of various teachers.

The students' understanding of research terms.

Another possible explanation for the dominance of non-significant results within the study is that students did not understand the research terms used, that is 'holistic' and 'analytic', or possibly that groups of students had a different interpretation of the terms than other students. This difference in understanding hid real differences in the data gathered here. If this were true the students ratings of the lectures would not reflect general opinions about the lectures but their opinions based on a specific interpretation - comparing such results together would therefore be pointless. For this reason a series a short interviews were carried out with the students. The aim of these interviews was to gain an understanding of exactly what the students understood the research terms to be. The full rationale, design and analysis of these interviews is presented in the appendix (Analysis of Interviews, pg I.1 - I.37). The results of these interviews categorically rejected the idea that either the students did not fully understand the research terms, or that there were notable differences in the definitions presented.

From the following summaries it can be observed that the students exhibited a fairly standard and complete understanding of the research terms:

Summary of holistic style.

The holistic lecture was interpreted as being a style of presentation which adopted a broad ranging, open format, which included using examples and metaphors from outside what could be called 'traditional academia'. The benefits of this format were that the student felt that they were more able to readily identify with the format as it was already familiar to them.

Summary of analytical style.

The analytical lecture was interpreted by the students as being more closely identified with a 'traditional' approach to lecturing and implicit within this

traditional approach to education, was the criticism that the analytical lectures bordered on rote learning. However, it appears that the clear and precise format of the analytical style inspired confidence in the student which they enjoyed. The fact that it was also associated with a 'traditional' approach was not constantly perceived as negative, "I saw them as proper academic lectures".

From these summaries it can be firmly concluded that the students understood the research terms used and that the understanding of the terms was relatively stable, in that their definitions did not exhibit a serious amount of variations from one student to the next. The notion that the non-significant results are in any way a product of the students misunderstanding the research terminology can be rejected.

Summary of discussion of source of non-significance.

The confounding effects of variables and the design of the study all have been illuminated as the source of the overwhelming positive responses to the lectures. It can therefore be argued that the source of the results is not as a result of poor design or other biasing effects, but rather a reflection of the student populations genuine perceptions of lectures and their learning within them. The implications for Kolb are simple, learning styles do not respond to lectures differently and there is no significant difference in the responses of learning styles to the attuned and non attuned lectures. This information cast serious doubt on the validity of identifying learning styles and using these learning style to characterise approaches to learning. If learning styles did in fact characterise an individual approach to learning it would be possible to create learning environments where they would perform better, as their approach to learning would be facilitated. The results of this study show that this was not the case. Learning styles did not perceive that they had learnt more effectively in the attuned lectures than they did in the non attuned lectures. It could perhaps be argued that attuning lectures may not be a simple matter of providing an environment where the abilities of that

learning style are facilitated. Learning may be enhanced by challenging the learning styles by demanding they operate in a different manner. If this were the case this should have been indicated within the results as every learning style not only received a lecture for which they were attuned but also three other which they were not attuned for. Two lectures where they were attuned for only one learning mode and one lecture where they were not attuned at all were presented. No lectures were rated more positively by any of the learning styles independent of whether they were attuned for that lecture or not.

The following possible explanations for the lack of significant difference were rejected.

- Poor attunement of lectures cannot be cited as the reason for lack of significant results as this was based directly on Kolb's definitions of learning styles.
- As the differences were based upon students learning styles any differences should according to Kolb's perspective have been important to students learning.
- The Hawthorne effect was accounted for in that the lectures were expressly designed not to radically vary from standard lectures and so prevented students from simply responding to the novelty value of the lectures.
- Social desirability shaping the students responses was shown not to be the case by the students not simply rating everything positively but rather thoughtfully responding to the questions.
- General confounding issues, such as teacher personality, were designed out of the experimental lectures.
- Brief interviews indicated that the students fully understood the research terms and the lack of significant results was not caused by the students having a wide variety of student interpretations of the research terms.

The lack of significant differences in the perception of students groups learning during the experimental lectures represents the opinions of the groups. Opinions which contrast with the predictions made by Kolb and those originally made by this study.

CHAPTER SEVEN: FURTHER DATA COLLECTION.

Analysis of second data set.

The results of the analysis of the first set of data clearly showed that learning styles did not differentiate between the students perceptions of lectures and learning in the experimental lectures. This cast doubt on the construct validity of Kolb's learning style measure. 'Does it really measure the difference in students approach to the learning environment'? It was felt that further study was necessary to gain insight in this centrally important question concerning the validity of Kolb's learning styles.

A series of measures were carried out during an additional phase of data collection, each of which addressed a question generated by the first data set. Due to the fact that the additional phase of the study was not originally designed into the project it was not possible to gain access to all of the original degree course groups of students used during the first stage. The statistics and psychology students for example, had broken into options groups and did not meet as a whole. The nursing students still met as a whole group and were used for this additional data gathering. As the first phase of the analysis showed that there was no significant differences in the learning styles or ratings of the different degree groups it was felt that the nurses could be used as a representative sample of the original population.

The additional phase of the study presented the students with four measures:

- Rotter's measure of locus of control
- A rank order questionnaire
- Second administration of Kolb's learning style inventory

Rotter's locus of control was used to discover if it was possible that some other form of classifying the students would allow distinctions in perceptions and ratings of the lectures to develop, for example it could be that internal and external control groups from Rotter would allow distinctions in approach to lectures to be noted. The rank ordering was used to force students to make a

comparative choice between the lectures. As the original design of the study was, it was possible that the students were rating the lectures on an 'of its types basis'. That is, they may not personally have found the lecture useful and perceiving they did not learn particularly well, but of its generic type the presented lecture was a good example and they learnt well considering the limitations. The forced choice rank ordering would over come this difficulty and any concealed differences in attitudes towards the lectures would be brought out. Finally, Kolb's learning style inventory was re-administered, this was done to discover how stable the measure was across time.

Learning Styles Across Time.

Summary Statistics for first and second learning style assignment

	L.S.1	Count	Percent	L.S.2	Count	Percent
Diverger	- 1	1	6.25	1	1	6.25
Assimilator	- 2	3	18.75	2	1	6.25
Converger	- 3	5	31.25	3	1	6.25
Accomodator	- 4	4	25.00	4	1	6.25
Fifth style	- 5	3	18.75	5	12	75.00
	N=	16		N=	16	

L.S.1 - first measured learning style
L.S.2 - second measured learning style

From the above summary tables it can be seen that between the first and second assessment of Kolb's learning styles there has been a shift in the distribution of the learning styles, particularly towards learning style five. So dramatic is the shift to learning style that only four of the sixteen subjects are not learning style five in the second assessment.

Sign test for first learning style rating with second learning style rating.

Cases

```
0  - Diffs (LS2 LT LS1)
11 + Diffs (LS2 GT LS1)          (Binomial)
5    Ties                        2-tailed p = 0.0010
--                               Critical value of s = 1 (N=11)
16                               P<=0.05 (two tailed)
```

Key - LS2 - Second learning style rating
LS1 - First learning style rating
LT - Less than
GT - Greater than

As the observed value of 's' is less than the critical value it can be concluded that there is a significant difference in the first and second learning styles. In summary this means there is no association between the first and second measure learning style. If the learning style inventory is reliably testing different approaches to learning, then the differences must be state rather than trait dependant, as the differences have fluctuated over a short period of time. Indicating that what is being measure is an approach at any one moment in time, rather than underlying features which effect students approach to learning in all conditions and across time. Hence, if Kolb's LSI is to be used effectively it can no longer be used to note association between degree course and learning style as learning style have been shown to be readily flexible.

N.B. The Binomial Sign test was used because the learning style ratings represent catergorial or nominal data. As the first and second learning style rating are for a single individual the design is repeated measures. Hence the most appropraite test of whether there is a significant difference between the first and second learning style rating is a binomial sign test.

Comparison of the first TLSIS[19] and second TLSIS

H_1 - There will be a significant difference in the TLSIS between first and second assessment.

t-tests for paired samples comparing mean of first TLSIS with second TLSIS

Variable	Number of pairs	Corr	2-tail Sig	Mean	SD	SE of Mean
TOTAL1				63.1250	2.419	.605
	16	.370	.158			
TOTAL2				62.5625	3.864	.966

[19] Total learning style inventory score (TLSIS) is established by adding the scores from each of the four learning mode scores together. The learning mode scores are gained from the LSI, which has nine sets of four words, each set has a word which reflects each learning mode. However, Kolb only uses the six most associated words (gained via factor analysis) to establish the learning mode scores. The six words used vary for each learning mode - reflective observation uses words from sets; 2, 3, 4, 5, 7 and 8, whereas concrete experience uses words 1, 3, 6, 7, 8, 9. Hence for each learning mode the scores of three words are not included and it is this which causes the TLSIS to vary. TLSIS is not simply the addition of the ratings of all nine words for all four learning modes.

```
  Paired Differences
  Mean        SD        SE of Mean        t-value     df  2-tail Sig
-------------------------------------------------------------------------
.5625       3.723       .931               .60      15       .555
 95% CI (-1.422, 2.547)

critical value of t = 2.131 P<= 0.05(two-tailed)
```

No significant difference was found between the first and second TLSIS mean hence the analysis failed to be reject the null hypothesis.

In conjunction with the analysis which shows that the measured learning style has changed between the two assessments, it is interesting to discover that the TLSIS has not significantly changed. That is, the sum of the learning modes, from which the learning styles are derived, have not fluctuated between the measures. The implications of this are that the distribution of the TLSIS shifts, hence causing different learning style but does not significant differ in total. It would appear therefore that students will be more 'flexible' in their approach than any one learning style will give them credit for. Yet students will be limited by an overall TLSIS which must be distributed between the learning modes. This TLSIS is relatively more stable than Kolb's learning styles, but it is not argued that it is fixed, as this would undermine any point in education if overall ability really were fixed.

Learning styles and forced choice rank ordering of lectures.

If the original notion that attuned lectures would be rated more positively than none attuned lectures is kept, then learning style groups should rank their attuned lectures more highly (1 being highest, 4 being lowest) than the none attuned lectures.

Learning styles (and code used in analysis).	Attuned lecture - Theoretically ranked highly	Lecture codes used for analysis
Diverger (L.S. 1)	Lecturer Holistic	Lec4
Assimilator (L.S. 2)	Lecturer Analytical	Lec1
Converger (L.S. 3)	Student Analytical	Lec3
Accommodator (L.S. 4)	Student Holistic	Lec2

Table 8.1: Association between learning styles, attuned lectures and lecture code.

A series of ANOVAs were carried out to discover if there was a significant difference in the rankings of each of the lectures between the five learning styles. None of the ANOVAs yielded significant results, that is no significant difference was noted in the ranking of any of the lectures between the learning styles. Even when forced ranking is used perception of lectures does not vary between the learning styles, no association between attuned lecture and learning style has been found.

Results of ANOVAs for ranking of lectures by first measured learning styles

	Result of ANOVA	Conclusion
Lecture one	F= 0.79, DF 4, 11	No S.D. pg F1.2
Lecture two	F= 0.81, DF 4, 11	No S.D. pg F1.2
Lecture three	F= 1.02, DF 4, 11	No S.D. pg F1.2
Lecture four	F= 0.80, DF 4, 11	No S.D. pg F1.2

Table 8.2: Results of ANOVA's for Learning style 1's rank ordered ratings of lectures.
Critical F value = 5.67 P<= 0.05 (two - tailed).

Learning style two.

The same analysis for learning style 1 was undertaken for the second learning style set. The results of this also indicated no significant difference between the

ranking of the experimental lectures between the five learning styles. (See appendix F1.2 for full analysis).

Results of ANOVAs for ranking of lectures by second measured learning styles.

	Result of ANOVA	Conclusion
Lecture one	F= 3.00, DF 3, 12	No S.D pg F1.3
Lecture two	F= 1.89, DF 3, 12	No S.D pg F1.3
Lecture three	F= 1.46, DF 3, 12	No S.D pg F1.3
Lecture four	F= 0.33, DF 3, 12	No S.D pg F1.4

Table 8.3: Showing results of ANOVA's for Learning style 2's rank ordered ratings of lectures. Critical F value = 5.67, P<= 0.05 (two-tailed)

From the analysis using learning styles it is clear that the aim of attuning a lecture to the needs of a specific learning style did not result in that lecture being ranked more highly. The attuning of lecture to learning styles appeared to have no effect on the students ranking of the lectures.

Summary of learning style ranking.

Ranking of the lectures was undertaken to discover if within the assessment of lectures the students were recognising the fact that any given lecture was a good representation of its type. That is, it would have been possible for a student to rate a lecture highly on the notion that 'of this type of lecture I learnt very well', but compared to another style of lecture very poorly. To discover if this was playing a part within the students were given the opportunity to rank order the lectures. No difference in the rankings developed. That is, no lectures were ranked significantly more highly by anyone learning style (either first or second learning style). The implications of this are that the learning styles do not assign the students to groups which have significantly different opinions about their performance in and attitude towards the experimental lectures. Secondly the notion that the students are purely objectively rating the lectures on a 'of this type' causing overly positive impressions of lectures to develop can be rejected. It

appears that the students were able to learn positively from all the experimental lectures and matching had neither a positive or negative effect on this learning.

Rotter's locus of control evaluation.

The perception of the lectures ratings are based on an individuals reaction and evaluation of a situation. A possible personality trait which may directly influence this evaluation is how a persons perceives their control within an environment, that is, are they acting upon the environment or is the environment acting upon them? (Due to the 'proximity' of the Rotter's' loci of control to the manipulation of control within the lectures it was speculated that this would be a worthwhile path of investigation.) To investigate this Rotter's (1966) assessment of *locus of control* was used. This assesses a person's locus of control when compared to a norm reference group, in this case each student was assessed in relation to the rest of the group, that is the group norm.

Descriptive statistics of results of Rotter's locus of control assessment.

The results below show that out of a possible 23 points available, the mean for the nursing BA(Hons) group was 13.250. This mean was used to divide the group into two sub-sets, students scoring 13 and below (internal locus of control) and those scoring above 13 (external locus of control). It should be noted there for that what is being presented here is relative locus of control when compared with the rest of the group.

Variable	N	Mean	Median	StDev	SEMean
Rotter	16	13.250	13.500	3.751	0.938

Variable	Min	Max	Q1	Q3
Rotter	8.000	20.000	9.250	16.000

Once the group had been sorted into relative internal and external loci of control these groups were used to investigate whether the original assessment of the four experimental lectures varied according to students' loci of control.

N.B. As this second phase of analysis is focusing directly on the overall perception of the lectures (validation of experimental design having being gained from phase one) three main areas were used to investigate this. These were, rating of control, style and feelings, as these covered the important features of the perception of the lectures.

Lecture ratings and locus of control.

Assessment of control in lectures according to locus of control groupings.

One-Way Analysis of Variance was carried out to investigate whether there was a significant difference between how internal loci of control students perceived the control within the lecture compared with external locus of control.

Table to show the results of the ANOVAs used to investigate the rating of lectures by internal and external loci of control groups.

	Rating of control	Rating of style	Rating of feelings
Lecture one	F= 0.63 DF1,11 No S.D. pg F1.4	F= 0.06 DF 1,11 No S.D. pg F1.5	F= 0.09 DF1,11 No S.D. pg F1.6
Lecture two	F= 6.69 DF1,11 SD pg F1.6	F= 0.34 DF 1,11 No SD pg F1.7	F= 1.77 DF 1,11 No SD pg F1.7
Lecture three	F= 1.47 DF 1,8 SD pg F1.7	F= 0.01 DF 1,8 No SD pg F1.8	F= 1.67 DF 1,8 SD pg F1.8
Lecture four	F= 0.97 DF 1,11 No SD pg F1.9	F= 0.08 DF 1,11 No SD pg F1.9	F= 3.33 DF 1,11 No SD pg F1.10

Table 8.5: Showing results of ANOVA's used to investigate the ratings of lectures by internal and external locus of control groups. P<= 0.05

From the above table it can be seen that there is a significant difference in the rating of control between internal and external locus of control for lecture two (Holistic student controlled). The control was rated more extremely student controlled by the internal loci of control students. Internal loci of control is associated with a perception of being able to act upon the environment rather than reacting to the environment. It would seem reasonable to argue therefore, that

internal loci control and student controlled environments are complimentary to each other. However, this relationship should extend to a pairing of external control and lecture controlled environments, and internal locus of control and analytical-student controlled lectures, such associations did not manifest themselves within the analysis. It must be concluded therefore, that there is not a simple relationship between internal and external loci of control and type of control within lectures.

The style of the lectures was not rated significantly differently by the two locus of control groups and no relationship between style and locus of control has been established. The internal and external loci of control did not distinguish the overall rating of feeling towards the lectures.

- No significant differences have been established between loci of control and ratings of the experimental lectures.
- Therefore, the hypothesised relationship between internal loci of control and student controlled lectures, and external loci of control and lecturer controlled lectures must be rejected.

Table to show the results of the ANOVAs comparing the effects of style and control on learning for the loci of control groups.

	Effect of control on learning	Effect of style on learning
Lecture one	F= 0.07 DF 1,11 No SD pg F1.5	F= 0.51 DF 1,10 No SD pg F1.6
Lecture two	F= 1.07 DF 1,10 No SD pg F1.6	F= 4.94 DF 1,10 No SD pg F1.7
Lecture three	F= 0.66 DF 1,11 No SD pg F1.8	F= 3.37 DF 1,8 No SD pg F1.8
Lecture four	F= 0.48 DF 1,11 No SD pg F1.9	F= 1.51 DF 1,10 No SD pg F1.9

Table 8.6: Showing the results of the ANOVAs comparing effects of style and control for the locus of control groups.

Table 19.6 shows that although the loci of control groups once rated the type of control significantly different from each other (see table 19.5 lecture two), never

was the perceived effect of control on learning rated as being different. In all cases the loci of control groups rate the perceived effect of lectures on learning as beneficial. The implications of this are that although the groups may rate the actual nature of the lecture to be different the effect of that lecture is rated the same by both groups.

Summary of Rotter's locus of control.

Locus of control was chosen because it appears to relate to the distinctions between student and lecture control within the experimental lectures. Lecturer control would fit with a an external control orientation, whether the individual perceives that they re-act to the environment rather than act upon it. This contrasts with internal control which is associated with the perception that the individual is an agent of action able to act upon the environment, this mirrors the design of the student control lectures. Despite these connections between the two types of lectures and, internal and external loci of control, no thematic associations were noted within the analysis. Internal locus of control did rate holistic student controlled lectures as more distinctly student controlled than external locus of control students, but this difference was not present in the other student controlled lecture (analytical student controlled) and external locus of control student did not rate the lecture controlled lecture more distinctly lecturer control.

It must be noted however, that the lectures were identified in accordance with the experimental design, that is, the style and the control was perceived in accordance with the experimental design and the students were able to correctly distinguish between the experimental lecture designs. So it was not the case that all lectures were perceived as being the same. Locus of control does not divide the students into groups which have distinct perceptions of the experimental lectures. The idea that students do not have fixed views of lectures which shape their abilities and

perceptions has been supported by this analysis, thus furthering the idea that students are flexible in the approach to lectures.

Conclusions from additional analysis.

Some of the possible doubts about the results gained from the main study have been extinguished by the results of this additional data analysis and it has also provided the study with further interesting data.

- The second measurement of learning style was found to have no correlation with the first, indicating learning styles are not stable across time.
- TLSIS were found to not significantly differ between the two measurements. (The implications of this are discussed full in the chapter 22).
- The Forced Choice Rank Ordering - rejected the notion that the *positive ratings* that all lectures gained were relative and the lectures were perceived as being 'Good of that type'. As no associations between learning styles and rank ordering of lectures were established the association between attuned lectures and learning style groups has been rejected once again. Thus it can be concluded that the students' positive rating of all lectures reflected their perceptions and not a flaw within the design of the study.
- No association between Rotter's locus of control and perception of lectures were noted.

For this study the most important results are that rank orderings fail to establish any association between learning styles and lectures. Supporting the original claim that Kolb's learning styles exhibit little construct validity. Secondly the results that learning styles fluctuate between measurements cast further doubt on the validity of learning styles. Finally the fact TLSIS remains stable across measurements is strangely contradictory to the learning style findings and this results is examined in detail in chapter 9.

CHAPTER EIGHT : DISCUSSION OF THE RESULTS IN CONTEXT.

Discussion of the results in context

One of the reasons for originally modelling this study around Kolb's learning styles was due to its popularity within education and areas wishing to gain an insight into learning. What should be noted however, is that popular usage does not necessarily translate into active critical research into the actual inventory or learning style theory. From a review of the literature the bulk of the citations to Kolb work are within articles which use Kolb's learning styles in a non-critical way, most often the inventory is simply use to assign students to groups or Kolb's experiential cycle is used to describe the learning process. This literature is of little use here as it simply reflects Kolb's popularity. Much of the work measures learning styles then moves on, the problems brought to light within this study will not appear problematical in such usage as test re-test reliability is not apparent if the learning styles are measured only once, hence no questions about reliability of Kolb's LSI will be raised. The theoretical foundations of the work will also not be investigated but rather accepted, probably because the theory's popularity.

However, it could be argued that the learning styles must be of some positive use to the researchers, teachers and educational practitioners or they would not use the theory, thus indicating a degree of reliability within the theory and LSI. This behavioural reinforcement argument leaves unelaborated what the 'positive use' is. The positive use may be extrinsic to the real purpose of the LSI.

The research that actually engages with Kolb's work in a critical evaluative manner is surprisingly sparse, this may well reflect the strong face validity which Kolb's work exhibits, along with the notion that Kolb is commonly used in all manner of learning environments, leading to the assumption that it is a useful and reliable etc. measure. (An assumption which was made early on in this study).

Of the evaluative work that was uncovered by a review of the literature one area that was relatively frequently investigated was the reliability and validity of the measure, overwhelmingly the research in this area was critical of the LSI.

(Freeman and Stumpf, 1978: Freeman and Stumpf, 1980; Stumpf and Freeman, 1981; Lamb and Certo, 1978: Lamb and Certo, 1980; Fox, 1984; Geller, 1979; Marshall and Meritt, 1984,1985; West, 1982; Bonham, 1988; Rule and Grippin, 1988). All these studies strongly questioned the reliability and validity of Kolb's learning styles and learning styles measures. The analysis undertaken revealed a significant difference between the first and second learning style measurement ($P <= 0.05$).

Kolb does attempt to counter such criticisms with the argument that the research which such studies undertakes is not appropriate to the LSI test.

> "This idea of variability seems essential, since change and adaptation to environmental circumstances are essential to any concept of learning. (1981, pg 290).

Kolb goes on to argue that in light of this, test re-test measures are not appropriate and should be abandoned in favour of split half reliability measure which he argues are more appropriate for assessment of a *state*. This study was not able to identify any research which had undertaken such reliability measures and even Kolb does not present any to support his work within *Experiential Learning*. However, as has been demonstrated here (see pg 213 - 252) Kolb may wish his learning styles to be perceived as flexible but he does not accommodate such wishes within the design of his theory. In fact Tyler's (1978) Possibility Processing[20] that work leads Kolb's learning styles down the track to ultimate stability. The argument that the learning styles are states not traits may counter the questionable reliability (That is test re-test measures are not appropriate for state measurements). But states like 'learning styles' are cast in serious doubt by possibility processing. A theory which leads to more rigid approaches not the flexible approaches which Kolb theory demands. Hickcox, (1990), also argues

[20] Possibility processing is outlined in detail in nine, but basically is the idea the experiences we have shape future experiences and interpretations of experiences.

that research which is critical of the reliability and validity of Kolb's learning styles is carried out by researchers;

> "who opposed the LSI format without understanding the underlying theory of Kolb's formulation of experiential learning" (1990, pg306).

Although not clearly stated, it appears that Hickcox is referring to the apparent flexible 'state' nature of learning styles. It is agreed that most of the studies that are critical of Kolb's reliability and validity view the theory as postulating a stable trait, but this view does not show that the researchers are working 'without understanding' as Hickcox argues, but rather that they are treating the learning styles as the Kolb theory ultimately presents them as being - 'stable'. [21]

The results of this study concerning the LSI and learning styles in general appears to align with most of the research assessing their reliability and validity, that is Kolb's LSI is not reliable and the distinctions between learning styles and their associated behaviours is not clear.

There is a considerable body of research which positively reports Kolb's work and views learning styles as a welcome addition to our knowledge about learners. Conclusions which appear to be at a tangent with the results gained by this study include: Abbey, Hunt and Weiser, (1985); Kurzich, Friesen and VanSest, (1986); Pelsma and Borgers, (1986); Pelsma, (1982); Sugarman, (1985). These studies from the field of counselling and social work all strongly emphasised the usefulness of Kolb's learning style theory with respect to individual development and the learning process. Baker, Cooke, Bromley, Hull, and Alpert, (1986); Baker Wallace, Cooke, Alpert, and Ackerly, (1988); Baker, Wallace and Cooke, (1987); and Whitney and Caplan, (1988), all research from the field of medicine, come to

[21] It should be noted that Kolb's theory presents the learning styles as relatively stable (see Kolb, 1984, pg 63) and indeed this is a necessity of learning styles if they are to be associated with degree disciplines and professions. This study however, views learning styles as flexible and transient, but the cited studies are assessing the reliability of Kolb's LSI hence the correct position is to view learning styles as stable.

similar conclusions that Kolb's learning style theory is a useful tool when teaching about the counselling techniques necessary for residency training. Noting that it was a useful way of showing the different possible approaches to learning, it was also presented that Kolb's learning style theory should be used when designing a curriculum. All this research viewed Kolb's theory positively but it should be emphasised that it was using Kolb's research in a very particular kind of way, that is, it was using the learning cycle as a way of highlighting the different approaches to learning and the different stages that are necessary within the learning process. None of the research used Kolb's work to assign learning styles to students and then try and teach to those learning styles. It is indeed possible that Kolb's learning cycle has a positive role to play in informing students about the learning process. The learning cycle has even be described as a logical necessity here it is felt that the learning process must in some way involve each of Kolb's four stages of abstract conceptualisation, active experimentation, reflective observation and concrete experience which are logically associated with the concept of learning and acquisition of knowledge. However, this use of Kolb is not the same as the practice of assigning students to learning styles and associating those with degree courses and professional groups. Vancleaf and Schkade (1987) working in the field of teacher education summed up the beneficial use of Kolb as being a tool to encourage self development of an individual within an academic group or field. This development comes about as a product of knowledge of different perspectives and stages of the learning process and not as a product of being assigned to a given learning style.

The evaluative research into Kolb's work is split into two main groups, firstly work which is critical of the reliability and validity of Kolb's learning styles, that is the psychometric properties of Kolb's work are under considerable doubt. Secondly, the Kolb's position on the process of learning and its cyclic nature is strongly supported. Such conclusions are in line with the results of this study, that is a while the assigning of learning styles is rejected as limiting to the students, the essence of the learning cycle is adhered to as a means of understanding the learning process. However, this study goes one step further to question the actual

theoretical basis for Kolb's theory, a basis which appears under close inspection to be patchy and weak. Such questioning of Kolb's theoretical foundations is not present within the literature and appears to be an area which has been over looked, perhaps due to the confident way in which Kolb claims support from research, support which is often sadly lacking when the veneer of confidence is removed (see pg 213 - 252).

This study has yielded many interesting results the most interesting of which for this study are firstly that learning styles fail to differentiate between the perception of learners, and secondly that all the experimental lectures were rated equally positively by all learning styles. That is, learners were able to equally effectively learn in a variety of learning situations. These results are quite different from what was hypothesised during the analysis of learning styles, as is evident when the original aims of the study are reconsidered, that is, to attune lectures to students learning styles with the objective of enhancing student learning within lectures. The implications and the subsequent re-evaluation of this study are discussed here.

Implications for lectures.

All the learning style groups have rated their perception of learning in lectures as being the same, but what is important for lecturers is that they rated the lectures as having a positive effect on learning, 'enhancing' learning. This indicates that the students perceived the *lecture* to be a positive and beneficial learning experience. This is an active rating of the lecture by students and not simply the middle response which could have been perceived as a 'safe' or 'conservative' response. Students were open to respond to the lectures in a number of ways and if they had wished they could have simply responded that the lecture had no beneficial effect on their learning. This would represent the middle response. However, they chose to rate the lecture as positively impacting on their learning indicating that this response is not simply a product of the 'middling' effect, which can occur on any

form of scaling response question, where their is often a tendency of respondents to select the middle response and avoid the extremes.

While this study is not able to counter a possible claim that students may have learnt more effectively using a different teaching method it is able to provide evidence that students positively perceived their learning within lectures and they did not view that lectures in any way inhibited their learning. This clearly indicates that lecturing is a useful teaching method, which students perceive they are able to positively gain from.

Implications for Kolb.

Not only has the hypothesis of this study been reject by these results, but as a consequence the validity of Kolb's learning styles comes under question. Kolb establishes four learning styles which approach learning in specific ways, attending to different features within the learning environment and benefiting from different approaches. Kolb argues that these differences are such that they become associated with specific degree courses and professions. In that certain degrees and professions, because they provide specific approaches to learning, attract and/or shape specific learning styles. Nulty and Barrett (1996) provide some evidence from their research that learning styles during a course of a degree programme move towards a learning style which encapsulates the needs of that discipline. However, it should be noted that they argue for 'behavioural adaptation' and according to this research they may have underestimated the speed and frequency of said adaptation. Although in *Experiential learning* Kolb argues that his learning styles exhibit a degree of flexibility, it will be argued in the next chapter, that any presented flexibility of learning styles is relatively minor and the overall presentation of learning styles is one of a stable learning style which many develop or change over time but is not open to dramatic or rapid change.

Based upon these results Kolb's learning styles can be questioned on two main fronts, either Kolb's learning styles do not reflect students approaches to learning or learning styles are more flexible than Kolb provides for within the justification of his learning styles. Of course these two factors could be acting in combination.

Learning styles do not represent students' approaches to learning.

Kolb establishes his learning styles based upon the basic learning process, that is concrete experience, reflective observation, active experimentation and concrete experience. Which of these four stages is emphasised by a learner establishes their approach to learning or learning style. If these learning styles are to be of value it is important that the learning styles are able to differentiate between approaches to learning, if they cannot the value of the learning styles becomes questionable. For if learning styles do not in some way reflect a quantifiable difference in students' approaches to learning, then their connections with degree course and professions must also be examined. In the critique of Kolb it is argued (pg 213 - 252) that despite his claims to the contrary the stability which is established for learning styles is not transitory and although it is agree all learning styles are open to development this will not occur rapidly enough, based on Kolb theory, for students to switch approaches between lectures. This point can be seen in Kolb's explanation of how learning styles develop.

> "Over time, individuals develop unique possibility-processing structures such that the dialectic tensions between the prehension and transformation dimensions are consistently resolved in a characteristic fashion" (1984 pg 76).

If the learning styles are developed over time then it would seem reasonable to conclude that any changes which occur in this developed structure of learning would follow the same basic principles as the development of the original structure. For if Kolb's learning styles are constructed using Tyler's (1978) theory

of possibility processing, then in order for changes to occur the possibility processing structures must change also (see pg 227). While no attempt is made to argue that such changes in possibility processing cannot occur, it has to be acknowledged that possibility processing structures are the product of past interaction, choices and the consequences of choices, a whole series of events which cannot instantly or even quickly be altered. These leaves us with the only conclusion that Kolb's learning styles are stable but under constant development. The development, based on possibility processing, is most likely to reaffirm the learning style but would allow for changes or shifts in approaches to learning. With this in mind the results of this study create serious problems for Kolb's learning styles, the central problem being:
If the learning style do represent different approaches to learning why do they not react differently to the lectures? (the lectures having been rated as significantly different from each other by the participants in the study).

The lectures have been shown to be perceived significantly differently by the learning style groups, yet the learning style groups do not perceive this has effect their learning. Kolb's use of possibility processing prevents the learning style groups from simply being able to shift their learning style in order to accommodate the demands of the various experimental lectures, yet in order to gain positively from all the experimental groups the students needed to exploit the approaches of various learning styles. While it is acknowledge that all learning styles have 'abilities' in all areas, the influence of these abilities is drastically reduced by possibility processing. For possibility processing creates 'personal programs' for how an individual will approach learning and also creates the situations where other possibilities are no longer recognised as viable alternatives. Hence the abilities in 'other areas' will not be exploited by the learners because their focus of attention will be on implementing the known learning style. This 'blindness' to other possibilities not only comes from the physical experience of a learner but the value system they have developed. Simply put, possibility processing presents some actions as worthwhile and others as diversions. Kolb recognised this points within his experiential learning theory.

> " Some people develop minds that excel at assimilating disparate facts into coherent theories, yet these same people are incapable of or uninterested in deducing hypotheses from theory. Others are logical geniuses but find it impossible to involve and surrender themselves to an experience. And so on" (1984, pg 77).

Here Kolb is recognising that the 'playing field' is far from even and any given learner is not free to choose how to approach learning but tied to their past experience and the value system they have established. He notes that learners can excel in one field and be 'incapable or uninterested' in another. It is argued here that this limiting in abilities is due to Kolb's use of possibility processing. For although Kolb notes students have abilities in all learning modes not just those which represent their learning styles, possibility processing reinforces the dominant learning modes at the expense of the subordinate learning modes, to the extent that it could be postulated that, eventually, interest in approaching learning outside the dominant learning style is lost. This does not imply any form of inability on the learners part but rather that these other approaches no longer are perceived as valuable and so quite logically are no longer exploited. Kolb refers to the subordinate learning modes as 'weak points' in a learners approach; while true this understates the case. If the structure reinforcement associated with possibility processing is allowed to run its course then the subordinate learning modes are no longer even recognised as worthwhile approaches to learning. All this combines to establish a situation where easy and rapid changes in approach to learning are not going to occur and it is on this point that Kolb's theory of learning styles and the results of this study clash. The results show students are able to learn equally effectively from a wide variety of lectures, lectures which represent different approach to learning. Kolb's theory of learning style groups would predict that the learning styles perceive that they learnt differently in the four experimental lectures. They do not.

Other possible explanations of results.

Before Kolb's work is further examined to try and establish an explanation for the results gained by this study, other possible explanations for these results will be investigated.

The effect of the five student identified positive features of lectures.

Discussion and justification of the lectures being significantly different have been presented and these remain relevant here. An issue that has not been previously considered is the impact of the important features of lectures identified by students. In methodology section it was noted that the lectures used within this study would be part of actual degree programmes. For this reason it was felt that it would be unethical to simply manipulate the lectures without concern for the students learning. For this reason students were asked to provide information about the seven most important features of a lecture. This information would be used to create a good basis by all the lectures, so that general perceived learning requirements were fulfilled for all lectures. The experimental lectures were built using the 'five features'. One possible explanation is that the five features identified by students were sufficient for all students to learn effectively in the lectures. Hence the styles of the lectures did not matter because the five features were present.

It was the goal of this study to provide lectures which the students could learn effectively in, hence the gathering of information which established the five base features.

The five student identified features were:

1. Use of lecture handouts.
2. Use of OHP's
3. Short breaks within lectures.
4. Approachability of lectures.

5. Use of humour in lectures.

Of these five features it must be remembered that the handouts and the OHP's were designed so as to reiterate the style and presentation of the lecture. (see design of experimental lectures - appendix) It was not therefore the case that the design of the lectures was being undermined by the use of standard forms of handouts or OHP's.

The short break in the lecture was simply that, approximately half way through the lecture, there was a break of about 4 minutes. The approachability and humour are more difficult characteristics to quantify. Essentially approachable was taken to be a lecture who was open to students coming for help or clarification of issues. Humour was used in all the four lectures, mainly to lighten the atmosphere, and while an exact plan for the humour was not created for each lecture an attempt was made to use humour evenly among the four lectures. Both approachability and humour reflect personal characteristics of the lecturer, as there was only one lecturer four all four lectures this was held relative constant when compared to the issues that would be raised if more than one lecturer had been used.
It could be argued it is the uniformity in the 'five features' which it at the centre of the uniform positive responses to the four experimental lectures. There is no empirical evidence from the study[22] to refute this claim but there are a number of factors which it contradict it. Firstly, the lecture handouts and OHP's are extensions of the lecture style and although all lectures had handout and OHP's the style of these was considerably different. Although breaks, humour and approachability may improve a students response to a lecture this cannot be interpreted as meaning they will not be sensitive to differences in style and presentation. Factors which may improve or inhibit their learning. If learning style

[22] The fact that there is no empirical evidence to refute the claim that the five base features caused all lectures to be positively perceived, does not represent a design flaw in this study. For it was necessary that all the lectures were presented in as effective a manner as possible, as the lectures represented part of the students degree programme. In order to study the effect of the five base features, presentation of what is considered here to be 'poor lectures' would have been necessary, such manipulation of student lectures was considered to be unethical and so not part of this study.

groups do approach learning in fundamentally different ways the differences in the experimental lectures will still effect their perception of the lectures, even if the five base features means that the students start from a more positive perception of lectures, the learning style groups should still rate the lectures differently.

The differences in the lectures were not sufficient.

This possible explanation is based on the notion that learning environments have to have a certain strength of features before they are attended to differently. Certainly it cannot be ignored that characteristics in the environment are going to impact on a students' learning (after all this is one of the basic features in the development of learning styles) but it should be remembered that Kolb presents learning style groups as representing how a learner approaches learning in general and is a characteristic of the individual and not the environment. Hence learning style groups should attend and respond differently to any given environment. What a converger gains from a learning environment, is not what a diverger would gain from the same learning environment. (This relates to the notion that possibility processing establishes an approach to learning were the variety of possible responses are reduced to a few characteristic responses). In light of this information the lack of different responses to the lectures cannot be explained as a product of the lectures being indistinct[23],as even if the lectures were the same the students should respond differently to them.

All learn well but differently.

One of the consequences of using students' perceptions of learning within lectures is that it is unclear as to exactly what the students mean when they perceive that a

[23] It should be noted that the lectures were perceived as different from each other and the argument that they are indistinct is contradicted by the results of this study.

lecture has had a positive effect on their learning or that the lecture has 'enhanced' their learning. As a consequence of this it is possible that students are referring to different things when they say each of the lectures has enhanced their learning. So although the response is the same the cause is different. This leads to a possible argument that a learner is able to find different features rewarding in all lectures and so give positive responses to all lectures. While this argument cannot be completely rejected based on the results of this study it has to be noted that if Kolb's theory is adhered to, such an explanation seems unlikely. If Kolb's connections between learning styles and professions are considered true then learning style groups 'prefer' these environments and it is likely this is because they gain some extra benefit from them. Kolb argues that the professions represent the learning styles' approaches to learning, that is Sociology, for example, provides an environment which facilitates the exploitation of assimilative skills. This leads to Sociology courses being associated with students with assimilator learning styles. The exact development of the relationship is not noted, in that it is not clear whether the course moulds the students or students with a given learning styles are attracted to the course. Either way an association between learning style and degree course is established. If learning in the associated way were not advantageous it would be difficult to explain why there would be any connection between course and learning style. This leads to the conclusion that learning styles are reinforced to gain maximum benefit from associated learning environments. If learners were able to gain from all types of learning environment equally well, then there would be no development of connections between degrees/professions and learning styles. As Kolb is able to produce connections between learning styles and degree/professions it can be concluded that learning styles do not learn equally well in all learning environments, and therefore learning styles select or are reinforced to perform optimally in specific environments. Thus the notion that students are able to learn equally effectively in the four experimental lectures, while not impossible would contradict Kolb's learning style theory.

The uniform positive perceptions of learning appear to reflect students actual perceptions of learning and not some subtle flaw in the experimental design. If this is the case what are the implications for Kolb's learning styles?

1. Learning styles do not reflect students approaches to learning.
2. Learning styles are far more flexible that Kolb allows for within his learning style theory.
3. Learning styles are far more broad than Kolb's learning style definitions.
4. A combination of the above factors.

The first possibility that must be addressed is that Kolb's learning styles do not reflect students actual approaches to learning. One possibility is that the learning styles represent a theoretical ideal but not how students actually apply themselves to actual learning. Kolb cites the work of Margerison and Lewis (1979) demonstrating the connections between Jungian dimensions, measured by the Myers-Briggs Type indicator, and Kolb's learning styles, measured by the LSI. As neither of these tests do measure actual application of approaches to learning it is possible that there is a difference between the self-report measures and the actions of students. Kolb does attempt to acknowledge this point.

> Both the LSI and the MBTI instruments are based on self-analysis and report. Thus, we are testing whether those who take the two tests agree with our predictions of the similarity between Jung's concepts and those of experiential learning theory; we are not testing, except by inference, their actual behaviour" (1984, pg 80).

Kolb deals with the fact that he does not test the application of his theory quite lightly. However, having a series of styles which reliably distinguish between students is of very little value if they do not represent how learners actually apply themselves within a learning environment Kolb fails to address the possibility that learning styles are theoretical phenomena which do not impact on actual learning but rather refer to ideal learning. This criticism of Kolb can be tempered however.

Kolb presents the results of Liam Hudson's (1969). Hudson shows significant difference in the learning modes scores of arts, social sciences and physical science. Again these scores do not reflect an evaluation of the actual application of approaches to learning, but as the three disciplines make different demands of the students it would not be unreasonable to conclude the difference in the scores represents different ways in which learning is actively engaged in. Although this seems a reasonable and logical conclusion, it cannot be overstated that Kolb presents no direct empirical evidence to demonstrate that his learning style represent actual differences in students' practical approaches to learning.

If it is accepted that despite the lack of empirical evidence Kolb's learning styles do in fact represent differences in students approaches to learning, the next issue which must be addressed is the flexibility of these styles. It is argued in chapter nine that Kolb presents learning styles as essentially stable and any notion of flexibility in approach to learning is a consequence of long term development and not rapid flexibility. The results of this study however, point towards learners being able to rapidly shift their approach to learning and move easily between learning styles. Such flexibility cannot be accommodated within Kolb's learning style theory, as it would radically contradict Kolb's explanation of the development of learning styles and the use of 'possibility processing'.

Can students' learning styles survive the introduction of this amount of flexibility?

The results of this study imply that a person with learning style is able to shift its approach to learning and accommodate differences in learning environment. Similar changes in measured learning style have been reported by Stutsky and Laschinger (1995), who found that both the original and revised LSI inconsistently categorised learning styles. Geiger, Boyle and Pinto 1994, also so significant differences in students learning styles during a degree course. Hence flexibility and change in learning styles have been previously reported. However,

in this study the time scale and frequency of such changes is much shorter than previously reported.

Students appear to have been able to change approaches between the lectures, which were only a week apart. In reality however, the changes were not germinating over the interim week as the students were not aware of the style of the next lecture, hence the changes appear to occur instantaneously as the demands of the lecture emerge. With such flexibility in mind the notion of learning style groups comes under question. It is argued here that learning styles cannot exist in connect with such a high degree of flexibility within the learning styles. For if a learner is able to quickly shift their style of learning and is able to equally effectively learn in lectures which emphasise different learning styles, the argument that the learning styles represents a learners dominant learning ability becomes very hollow. The logical extension of this is that students do not have a learning style but rather learning styles, these styles probably in some way being related to the environment in which they find themselves. Evidence for this can be found within this study. The statistics and nursing students were measured twice on the LSI, when analysis of the results was undertaken it showed that there was no association between the first and the second assessment of learning style (see pg 178) that is learning style had changed from the first to the second assessment of learning style. This result further challenges the notions of learning style. It appears that students are not simply flexible in their learning styles, for this would demand that the students had a fixed point from which they radiated out to other approaches to learning when necessary - a fixed point that was returned to once the features of a specific learning environment had been dealt with. The results show however, that the students' assessed learning style changes, so there is not even a fixed point within students approaches to learning; they are totally flexible in their approach. Such flexibility demands a radical rewrite of how learning styles are defined and used.

Re-evaluating Kolb's theory of learning.

If the results of the study are accepted, Kolb's learning styles and learning theory must be re-evaluated. Kolb's theory is made up of two main elements, it is important to discover whether the whole theory needs re-evaluating or just part of it, clearly there are problems with learning styles, but what must be investigated is source of these problems. Caution must be taken not to reject useful aspects of his theory. Hence the two main aspects of Kolb's theory will be investigated independently, the two aspects to be considered are:

- Kolb's theory of learning.
- Kolb's theory of learning styles.

The learning cycle.

Kolb's theory of learning is base upon the learning cycle, a four stage process which represents the processes a learner must go through in order to learn. Kolb develops this model from earlier education's theory, most obviously in the work of Lewin (1951) and Dewey (1938) (see pg 21 - 59 for detailed explanation). Kolb's learning cycle demands that a learner engages with all four stages of the cycle if full learning is to occur. That is a learner must have concrete experience, and exercise reflective observation, abstract conceptualisation and active experimentation. Learning which does not engage with all four elements is flawed and cannot be viewed as learning. Kolb notes there is no hierarchy of stages and there is no set order in which students engage with the stages, only a requirement that they all must be engaged with.

Kolb's theory of learning is a process model that concerns itself with the act of learning rather that the products of learning. The process that is put forward places a great emphasis on the 'whole' process; although it can be broken down into sections, only when the sections are formed into a whole can the learning be considered to occur. It is argued here that this concept is in tension with the notion

of learning styles. Learning styles are the product of just two of the four learning modes which constitute learning, thus learning styles do not represent the whole learning process but rather just part of it. In itself this could just be a recognition of the practical implications of a theory. Kolb could simply be arguing that the whole learning process is important but learners do have areas of excellence, ways in which they prefer to learn. This does not mean the other sections of the learning cycle are absent or ignored but rather they play a secondary role. The whole learning cycle is engaged in, but each learning mode is not equally exploited. In the light of this the learning cycle could perhaps be better conceived of as an elliptical path. As an elliptical path that is still able to enter all stages but does not do so equally, as a more concentric or circular path would demand.

This information appears to create tension between Kolb's learning cycles and the use of learning styles. However, it must be noted how learning styles are established, that is heredity, personal learning history and immediate environment. These together combine to form a 'personal possibility processing structure' for each individual learner. This structure is said to work using positive feedback, which makes past successful actions more likely and alternative actions less likely. Essentially this means that a learning style gradually becomes more and more typical of a given style, at the expense of other styles. Such a situation results in the barest of 'lip service' is being paid to engaging with all four stages of the learning cycle. Essentially learning becomes typified by the abilities of the preferred learning style and not the characteristics of the learning cycle. It is this which allows Kolb to attributed learning styles to degree courses and professions. If learning were typified by the learning cycle this would not be possible. Kolb does not problematise this tension between learning style and learning theory. Noting only that in the production of learning styles;

> "...for the purposes of analysis we treat the abstract-concrete (AC-CE) and active-reflective (AE-RO) dimensions as negatively related in a unidemensional sense..." (1984, pg 76) .

This represents Kolb's foundations for learning styles and is indeed a necessary factor if learning styles are to be developed. Yet such a perspective is contradicted by the needs of a learning theory based on a cyclic approach.

> "We emphasise that these dimensions are not unitary theoretically, such that a high score on one orientation would automatically imply a low score on the opposite, implying that a higher-order synthesis of opposing orientations makes highly developed strengths in opposing orientations possible" (1984, pg 74).

Again the facilitation of the possibility of high order abilities in opposing orientations is necessary within a holistic theory of learning. These two quotes emphasise how fundamentally learning styles and a cyclic learning theory are in opposition. They demand opposite characteristics from the underlying theory. A learning cycle demands that the opposing orientations are viewed as independent from each other, thus freeing the learning to establish skills in both. Where as learning styles demands that opposing orientations of learning are presented as negatively related, so that abilities in one area are developed at the expense of abilities in the other. Problematic relationship between learning styles and the learning cycle were highlighted by Geiger, Boyle and Pinto (1993), who found strong evidence for the four learning styles as part of the learning process but not the relative learning preferences as posited by the theory. It now becomes apparent that the differences in learning cycle and style are not minor. Learning styles cannot be explained as being the practical applications of a learning cycle. Learning cycles and learning styles as Kolb has developed them are mutually contradictory. To have both within a single approach to learning fundamentally undermines the theory.

What can be done with learning styles and the learning cycle?

It has already been stated that this study has no bearing on Kolb's learning cycle theory and the author believes the model to be broadly justifiable. Likewise

learning styles appear to be useful insights into possible ways to engage with the learning environment. Both aspects appear to have something useful to add to our understanding of learning. The question that must be addressed is that can the two clearly opposing features be made to fit within a single theory. It has already been shown that Kolb's use of the two factors results in a contradictory situation and that if they interpretation of learning cycles and styles are not radically reshaped this contradiction would continue to assert itself within future theories.

The results of this study have contradicted the notion of stability within learning styles. The notion of possible long term development or change within learning styles has not been demonstrated within results. What has been shown is radical and rapid shift in learning style. This result forms the foundation to the reinterpretation of learning styles. As learning styles are able to rapidly and radically change, the notion that the learning modes are 'negatively related' even for 'the purposes of analysis' must be rejected. The initial implications of this are that learning style classifications can no longer survive, as their defining characteristics are lost. If the learning modes are not negatively related then no clear image of learning style will develop, just an overall learning ability or awareness. However, learning styles can still be kept if they become associated not with the learner but the learner's interaction with the learning incident. This not a 'clever' semantic argument, which over problematises terms used by Kolb, but is rather a fundamental shift in where learning styles are situated within the learning experience.

Kolb cites learning styles within the domain of the learners themselves. The trait / state issues aside, at no point does Kolb argue that learning styles are not personal qualities of the learners. Qualities which are actively controlled and applied by learners. What is presented here is that learning styles are cited within the learning incident itself. This incident of course involves the learner but also highlights the incident itself. Thus a learner does not have a learning style, but based on the demands of that situation and the broad range of abilities at their disposal they engage in a learning style. In this interpretation of learning styles they have

shifted completely away from the individual learner and personal qualities of that learner and become methods available to a learner. Learning styles can be thought of as a sort of cognitive tool bag which a learner may dip into when necessary, a bag from which they are free to remove any style they wish.

How does the new interpretation resolve the conflict between learning cycle and learning styles?

The source of the conflict between the learning cycle and learning styles is the interpretation of the relationship between learning modes. The learning cycle demands that they are viewed as independent, where as the learning styles demand that they are perceived as negative relative (within their dialectic pairs). The reason why the idea of learning style demands that learning modes be viewed as negatively related is that such a perspective is necessary in order that styles can actually be established. The LSI measures learners abilities in all four learning modes and students will have abilities in all of these four areas, but recognition of abilities in all four areas is not possible if a single learning style is going to be attributed to a learner. Hence the learning mode scores are treated as negative correlated, so that the highest mode score in each of the dialectic pairs is the one which is expressed within the learning style. In turn the reason why style have to be discretely established is to be able to assign learning styles to specific individuals. What learning incident styles do is remove the need to assign a style to a learner and in turn therefore remove the need to view the learning modes as negatively correlated. A learning incident style will still only use two learning modes, but it does not comment on or refer to other abilities. It focuses on that incident and that incident alone. The next incident could exploit completely different learning modes. Hence learning modes can be viewed as independent of each other. This immediately removes the tension between learning styles and the learning cycle. As both now are able to treat the learning modes as independent

Learning incident styles Vs learning styles

It does appear that if learners are still exhibiting style like abilities then it would be possible to react according to the characteristics of a single style. However, this ignores the fact that styles of learning are no longer simply a product of the learner but also the situation as well. The situations in which learning occurs are immensely varied. Each will demand different application of the learners for learning modes. This immense variety of demands would prevent 'learning styles' being established, as constantly different demands would be made of the learner. In fact it is argued here that if a learner does establish a learning style this will be a dysfunctional approach to learning for that style of approach will not be appropriate for the vast array of learning incidents they face. An example of how the learning incidents will be solved differently can be seen within the results of this study. The LSI was completed twice by statistics and nursing students; the inventory was administered in the same room approximately four weeks apart, the students were tested within the same framework, that is they were tested in an environment in which they were considered to be students. Yet even within these two very similar learning environment the students approached learning in statistically significant different ways. Hence the notion that a single dominant learning style will arise due to the learner acting and reacting in the same way is not accepted because the demands made of them vary and appropriate responses to these demands vary also. This conciliation however, does not take into consideration Possibility Processing, something which Kolb cites as a major factor in the development of learning styles. In order for Possibility Processing to develop there needs to be a degree of consistency of input. Kolb argues that initial constancy is established due to heredity and learning history. It has already been argued that to present learning history as in any way consistent ignores the vast variety of learning situations which face learners and the specific demands these make on learners. Heredity may introduce a degree of stability but Kolb fails to explain how heredity influences learning and so it is difficult to present counter arguments, but it has to be recognised that a learner has to perform in a variety of learning situations and all learners show great abilities across the board so the

effect of heredity is tempered by experience. In light of this interpretation of learning, stability is absent from the development of the approach to learning. Without this stability the rigid positive feedback loops cannot be established.

However, Possibility Processing has a role to play and that is in developing individuality. Possibility Processing comes from Tyler's work on Individuality (1978). Tyler's work set out to increase the status of individuality within research, the notion that ideographic research was a valid form of research. This change to studying the individual was also associated with other important changes.

> "Perhaps the most fundamental change is a shift from reaction to action as the phenomenon to be studied" (1978, pg 2).

Along with this change came a change in the aims and objectives of study from 'prediction and control', as Tyler expresses it, to 'understanding'. The focus on individuality of Tyler's work does not appear to be recognised within Kolb's use of Tyler's research. In fact the Tyler's emphasis on individuality is strongly contradicted by Kolb's assigning of learners to specific learning styles, a process which runs counter the recognition of individuality. In the conclusions of this research Tyler's emphasis on individuality can be reinstated as the position does not demand that learners are assigned to specific learning styles. Hence differences in responses can be valued form themselves and not perceived as undermining the distinctions between learning styles. What possibility processing is doing is allowing free expression for the individual.

> "A person must select and organise, and the characteristic means for doing so constitute one of the most fundamental aspects for individual personality" (1978, pg 12).

As there is a wide variety in the learning experiences of learners possibility processing is acting to express individuality and not acting to generate learning styles.

If a learner does not have a learning style what do they have?

If approach to learning is viewed as a product of learner and learning incident, what does the learner bring to the situation? As learning styles as personal characteristics have been rejected, other means of presenting the qualities that learners have must be put forward. The answer to this question underlies the shift that has occurred in the presentation of learning modes. This study firmly presents learning modes as being independent, each bring distinct qualities to learning and as Kolb argues within his justification of the learning cycle no one learning mode is more important than another. It seems reasonable to conclude therefore that what a learner brings to any learning incident is the sum of these learning modes. In this study this sum of the learning modes is referred to as Total Learning Style Inventory Score, TLSIS. The TLSIS is an expression of the total abilities which a learner brings to a situation, these abilities can be used in any manner as best fits the learning incident.

Before extensive use of TLSIS can be made a number of issues raised within the discussion so far have to be addressed. It has been noted that assigned learning style within this study have been shown to change between two measurements. As TLSIS is a product of the same information as learning styles, this could mean that TLSIS is just as flexible and does not in any fundamental way represent learners abilities. However, the analysis showed that although learning styles changed between fist and second assessment the TLSIS remained stable. That is, the students shifted their emphasis within their TLSIS but did not vary this. The important implication of this is that TLSIS is not simply a sum of the learners four learning modes.

CHAPTER NINE : PROBLEMS AND INCONSISTENCIES WITH KOLB'S WORK.

Kolb's relationship with Jung.

Kolb cites the work of Jung on typologies (1923) to underpin the structure of his model of learning styles. While he acknowledges there are a number of areas of contention between the two theories, the overwhelming argument is one of an important and substantial connection. Kolb quotes Jung's work at length and dedicates an extensive part of 'Experiential Learning' to the relationship between Jung's work and his own (see Experiential Learning Chapter Four, Pg 61 - 85). However, despite this extensive attempt to link the two theories the reader is left unsure as to exactly what are the connections. This uncertainty arises because what Kolb cites as connections, are frequently contradicted elsewhere by Kolb himself or under close examination are not the unproblematic connections that Kolb implies. This section will unpack the claims Kolb makes about his own work and that of Jung and examine in detail if these connections stand up to close academic investigation.

One of the most important claims Kolb makes about his work and the typologies developed by Jung is that they draw on the same basic differences in personality. Learning styles and learning modes are supposed to be new interpretations of individual differences identified by Jung and so draw on the same recognised phenomena (thereby gaining the self-same academic weight associated with the work of Jung).

> "Thus, his [Jung's] conception of types or styles is identical to that proposed here - a basic but incomplete form of adaptation with the potential for development via integration with other basic types into a fluid holistic adaptive process" (pg 79)

Not only does Kolb claim the concepts underpinning types and styles are the same but that learning styles can be mapped onto Jung's concept. The claimed connections are:

> "The sensing type is associated with the accommodative learning style, and the intuitive type falls in the assimilative quadrant; the feeling personality type is divergent in learning style, and the thinking types are convergent" (pg 82 - 83.)

Kolb is not simply arguing his styles are in some way similar to Jung's concepts but rather they are synonymous with his types. This claim cannot be supported by a careful reading of Kolb. The grounds on which Kolb asserts that the connections he makes are valid is the comparison of results from the Myers-Briggs Type Inventory and his own Learning Styles Inventory. The MBTI is an operationalisation of the Jungian types (in the current context let us assume operationalisation is unproblematic), hence if connections can be found between the results of the MBTI and the LSI a direct relationship between Jung's and Kolb's work can be accepted. On page 82 Kolb presents a table (figure 4.4) of the correlation of the results of the LSI and MBTI (Data is gained from three studies Taylor 1973, Lynne, 1975[24] and Margerison and Lewis 1979.) Of the 96 possible correlations, only 70 correlations are presented (twenty six correlations being unable to be calculated due to missing data). Of the seventy correlations actually calculated only 18 were found to be significant. Already the close and direct connections that Kolb argues for between the theories is beginning to look questionable. If the 18 significant correlations are then examined the highest correlation is -0.42 for the association between Jung's feeling concept and a learner's rating on the abstract conceptualisation (AC) and concrete experience (CE) scale. Although this result is significant the actual implications of this significant result should be unpacked. A correlation of -0.42 accounts for approximately twenty percent of the variance of the scores. [That is, if the scores on the feeling scale from the MBTI were known then an observer would stand a one in five chance of predicting, based on this information, the AC-CE score]. This clearly indicates that the significant result lends little support to a connection. It is even possible that the correlation could be the product of spurious

[24] Although Kolb cites Lynne, 1975, the full reference is not in his bibliography making it impossible to verify his interpretation of Lynne's work.

connections between items on the two scales as much by fundamental connection between the underlying features of the two scales. The overwhelming conclusion therefore is that the two scales are *not synonymous.* It must also be noted that this is the highest correlation and all other correlations are able to account for even less of the variance between the two scales. However, Kolb fails to problematise these significant results and uses them as clear evidence of connection between the two scales[25]. Kolb goes on to make great play of the definition of the types given by Myers-Briggs' and those presented for his own learning styles. The first thing that must be considered is that as Kolb notes (pg 80), but fails to adequately acknowledge, that Myers and Briggs worked with heavily 'Americanised' versions of Jung's types. Thus within the work of Myers-Briggs, extroversion is associated with social and personal ease and gains the positive attributes socially associated with this position, whereas the introvert is presented as shy and awkward within social situations. This indicates that at best Kolb is associating his types with a partial interpretation of Jung's work [one that essentially must be viewed as wrong if adhering to the aims and objectives of Jung].

The disregarding of Jung's subordinate types.

If the problem of the underlying interpretations of Jung's concepts within Myers-Briggs' definitions is laid aside there are still serious problems with the connections Kolb draws out between learning styles and Jungian personality types. Kolb focuses on the dominant functions of Jung's types as defined by Myers-Briggs, highlighting how these are echoed within his own definitions of personality types. Accommodator is connected with extraverted sensing type; links can be drawn between the Accommodator's ability to 'adapt to changing circumstances' and with the extraverted sensing type's attitude of 'accepting the facts' that are presented. Likewise the Accommodator's strengths 'lie in doing

[25] It has to be acknowledged that Kolb does in fact note that the test only in fact measures "whether those who take the tests agree with our predictions of similarity .. we are not testing actual behaviour" (pg 80). This is because both tests are based on self analysis and report and hence cannot be used to explain actual behaviour. [Kolb also acknowledges that the MBTI reflects American interpretation of Jung's concept, which may influence the results gained].

things' and extravert sensing types 'get far more from first hand experience'. Kolb completely ignores what must be one of the centrally most important features of Jung's work, that is the dominant function cannot exist without the subordinate function, they exist together in a mutually dependant interaction. The dominant function is obviously that which is most often perceived within an individual's actions, but it does not exclude the action of the inferior functions being manifest in behaviours. Also any dominant function has to be understood with knowledge of the action of the subordinate function. Hence whenever the extraverted sensing type is discussed it must be done so in the light of the connected inferior functions of introverted intuition. A person cannot purely act in an extraverted way; they must do this with some implicit knowledge of introversion. The same relationship is true for sensing and intuition. The inferior type not only acts as perspective for the superior type but also expresses itself within the action of the individual. This expression does occur simply as a result of the dominant styles being thwarted but rather in a dynamic interplay. This interplay is illustrated within the work of Von Franz (1971).

> "I knew a woman who was one of the best mountaineers in Switzerland. She was obviously an extraverted sensation type; only rational facts counted, and everything had its natural causes. She could claim all 4,000 mountains not only in Switzerland but in the whole range of the Alps - the French, the Savoyan and the Austrian and well. But on dark evenings afterwards, with a good fire burning, she would switch over and tell you the most eerie ghost stories, of the types you normally hear among shepherds and peasants. It was quite wonderful to see this primitive fantasy coming out of her. The next morning when she put on her boots she would laugh it off and say it was all nonsense! What such a person intuits is usually an expression of his personal problem. (pg 24.)

The inferior functions here are expressed in dynamic interplay with the dominant; the mountaineer is not simply an extraverted sensation type. If this were the case the ghost stories would be impossible to explain, as they stand in stark contrast to

the orientation of an extroverted sensation type. The mountaineer can only be understood as an extraverted sensation type with inferior introverted intuition functions. Once this full picture is established the contrasting actions of an individual can be explained. Yet this overwhelmingly important connection between dominant and inferior functions is ignored by Kolb, when he attempts to mark out the connections between his styles and Jung's types. Hence to argue that these represent connections between Kolb's styles and Jung's types is incorrect, for Jung's types are both dominant and inferior functions. What Kolb argues he has achieved is to establish connection between his styles and the dominant functions of Jung's types, what could perhaps at best be seen as a half connection. Yet on reflection the connection cannot be seen as half, for Jung's types are not simply the dominant and subordinate functions added together, they are the products of the integral dynamic abilities that exist between these two functions. Drawing connection between learning styles and one of these cannot be viewed as evidence for fundamental connections between the two measures. For example, within an accommodative approach to learning there has to be an a subordinate assimilative function within the learning process. What is occurring is that the subordinate assimilative function is being expressed and not the dominant function being contradicted.

There are also more pragmatic problems with the connections Kolb's establishes between his learning styles and Myers-Briggs definitions of Jung's types. Working with the connections between accommodator learning styles and extraverted sensing type, Kolb ignores the fact that the extraverted sensing type is described as "Being a perceptive type. Kolb looks for the satisfying solution, instead of trying to impose any 'should' or 'must' of his own, and people generally like him well enough to consider any compromise he thinks 'might work'(*Experiential Learning* pg 83). This runs contrary to Accommodators being described "sometimes seen as impatient and 'pushy'" (*Experiential Learning* pg 78). Connecting a type that is perceptive and sensitive to the needs of others with one that is described as pushy seems to be dubious. Kolb does not comment on these differences between the types and styles preferring to focus on the few overt

connections between the two. Similar anomalies between the other styles and types also exist; but here to the focus remains firmly on the overt similarities, the differences are not acknowledged.

The connection between Jung's types and Kolb's styles appears dubious. The statistical analysis points towards only weak connections, in a few areas between the styles and types. The definitional connections Kolb makes are based on Myers-Briggs' definitions that are influenced by American interpretations of introversion and extroversion, and so are not truly representative of Jung's work. With the definitions there are connections which Kolb leaves the reader to extract. However, there are also contradictions which Kolb does not recognise or address in any way. The connection Kolb is able to imply between types and styles is based only on dominant aspects of Jung's types and pays no attention to the subordinate aspects of any type. Thus the claimed links are made are not with Jung's full concept and definitions of types just the dominant part of them. Considering this evidence Kolb's claims that his work draws on the same psychological features as Jung's work on typologies is not founded. The work of Jung only exhibits a superficial resemblance to that of Kolb's. The underlying epistemologies and operation of the two theories are completely different.

A different epistemology to Jung.

The conclusions of the above critique of the connections between Jung's and Kolb's types, that the two theories exploit fundamentally different epistemologies could not be countered by Kolb. Kolb established his own epistemology to be in contrast to that of Jung's and other idealists.

> "In formist epistemology, forms or types are the ultimate reality, and individual particulars are simply imperfect representations of the universal form or type. ... An alternative epistemological root metaphor, one which

> we will use in our approach to the understanding human individuality, is that of contextualism" (pg 63).

It seems extremely odd that Kolb would make such bold claims (however unjustified they might be) for connections to a theory that is based on a fundamentally different epistemology. At this point Kolb's is obviously distancing his theory from the idealist perspectives of Jung and others, more than likely due to the criticisms which idealists often face. Idealists are frequently charged with the notion that they trivialise human complexity and result in type theories that are little more than stereotypes.

Kolb makes a strong effort to express the action and needs of the individual within his learning style theory; citing his use of contextualism as a means of setting himself free of the stereotypes associated with categorisation.

The root metaphor that Kolb presents sets him apart from the work of Jung that emphasises the importance of ideal types and forms. Even with this clear statement of epistemology it is unclear exactly where Kolb places his theory, as the very identification of the styles seems to set him at odds with contextualism.

Within contextualism, emphasis is place on the environment in which a learner is acting when trying to understand how they will learn. The same degree of emphasis is placed on the environment as the learner's personal qualities. It is only out of the relationship between the two that approach to learning can be understood. In light of this underlying notion within contextualism Kolb does place an emphasis on the immediate learning environment when presenting his theory of learning.

> "At the other end of the continuum are those increasingly specific environmental demands stemming from out career choice, our current job and the specific task that shape us. These exert a somewhat stronger but more situational-specific influence on the learning style we adopt" (pg 98).

However, Kolb *attributes learning styles to the learners themselves* and although he recognises the influence of the environment, he makes no attempt to describe exactly what this influence is or how it can best be understood. Although with type theories the common action is to assign the type to the individuals, in contextualism, there is no more reason to assign the type to the individuals as there is the environment. Hence it would be equally reasonable to say that Mathematics, is an 'X' type of learning environment, as it would be to say that student 'A' has a convergent learning style. The whole essence of contextualism is to place the individual within some form of context or: to view the individual always within a definite environment - a context that will mould and shape their actions. Yet apart from Kolb's acknowledgement of the influence of environment he makes no further reference as to how to accommodate the environment when attempting to understand learning. If the definitions of learning styles are studied (pg 68 - 69) it is apparent that the focus is on personal qualities of the learner, their values, their abilities and their likely reactions. No reference is made to the effect of context. The fact that Kolb does not address the issue of the effect of the environment in any active sense limits his attempts to be viewed as a contextualist. For he has presented only half the information needed; the context also needs to be understood. Yet Kolb recognises context's role within a stable learning style.

> " The stability and endurance of these states in individuals comes not solely from fixed genetic qualities or characteristics of human beings; nor, for that matter, does it come solely from the stable, fixed demands of environmental circumstances. Rather stable and enduring patterns of human individuality arise from consistent patterns of transaction between the individual and his or her environment" (pg 63).

The learning styles give information about the 'characteristics of human being' but Kolb recognises that 'solely' this does not account for any stability of learning style. Transactions are cited at the root of any stability. It is therefore of central importance that the transactions are understood with knowledge of both sides of

the transaction. Kolb fails to comment on any of these transactions. Without this information it becomes exceptionally difficult for a contextualist perspective is to be kept. This results in a situation where Kolb own position becomes exceptionally unclear. However, the important issue is that Kolb is arguing that his work falls within a contextualist position and at the same time believes he is able to directly connect his work with Jung's idealist position. To bring together these two contradictory epistemologies is highly problematic and connections made between the two must be viewed exceptionally cautiously.

Idealism: The unwanted connection with Jung.

From this analysis it is impossible to justify Kolb's claim that he is a contextualist. If Kolb is not a contextualist, then what position does he adopt? If Kolb's theory is to be understood the epistemology he uses must be identified. Kolb cites Maslow (1970) and his 'Hierarchy of needs' as an archetype of a contextualist position. This seems quite reasonable as Maslow spends considerable amounts of time noting exactly how environmental factors will effect our cognitive processing. The individual and the context are explicit within Maslow's theory. This is not the case for Kolb; as only the individual and their potential for action are exhibited within Kolb's theory. One pointer that indicates Kolb's underlying epistemology is his notion of 'Experiential learning theory of development'. Here Kolb outlines three basic maturational stages of development, acquisition, specialisation and integration. These stages reflect the increasing levels of sophistication of a learner as they mature with age. Kolb does note however, that these stages of development are not certain and the final stage may never be completed or even entered.

> "Some may never have this experience, so immersed are they in the societal reward system for performing their differentiated specialised function" (pg 145).

It is not unreasonable to see the shift in learning as a move towards an 'ideal' intergrated approach; which is not achieved by all but open to all to be achieve. The language Kolb uses to describe the benefits of achieving indicates that this intergrated approach to learning is a more advanced and sophisticated approach to learning.

> "The net effect of these shifts in perspective is an increasing experience of the self process. A learning process that previously been blocked by the repression of the non-specialised adaptive modes is now experienced deeply to be the essence of self" (pg 145).

The implication that the specialisation stage (the stage before integration) is 'blocking' full and proper learning, points towards integration being the ideal to which a learner should strive. The type of learning that is gained only by a few, learning which facilitates the ability to 'deeply' learn and the self to become full understood. It is implied that integrated learning is not a different way of learning but rather that it is a better way of learning.

With the knowledge of the integrated learning approach in mind and the notion that there is a maturational series of stages within learning it is difficult to distinguish exactly how Kolb can justify the fact that his theory is not one that constructs an environment where a learner strives towards an ideal. Kolb even uses Jung's work to explain the process that is undergone as a learner develops through the maturational stages.

> "Yet it is Carl Jung's formulation of this conflict and the dimensions of its resolution in his theory of psychological types that is most appropriate here. The Jungian theory of types, like the experiential learning model, is based on a dialectic model of adaptation to the world. Fulfilment, or individuation, as Jung calls it, is accomplished by higher level integration and expression of non-dominant modes of dealing with the world. This

drive for fulfilment, however, is thwarted by the needs of civilisation for specialised role performance" (pg 144).

However, Kolb seems to ignore that Jung's types are based on the striving toward an ideal. Kolb has noted that he does not wish his theory to be viewed as formist or idealist but rather contextualist. These two points are clearly at odds that each other, for Kolb is saying that there is a basic shift toward an ideal (an integrative approach), as within Jung's theory, but states that his approach is a contextualist one.

As Kolb does not present a full integrated contextualist position and in fact gives a perspective that focuses purely on the learner's personal abilities, his position as a contextualist is cast into serious doubt. This is compounded by the fact that within his theory Kolb establishes an ideal-like integrative approach, which represents the most sophisticated approach to learning, sophistication that is not achieved by all. Finally Kolb uses Jung's explanation of how his types achieve individuation as an explanation of how the integrated learning position is achieved, a process which Jung exploits in line with the shift toward an ideal. What Kolb presents is a theory that cannot be described as being based upon a contextualist epistemology. Despite his overt claims to the contrary, the evidence from Kolb's own theory is that his approach is an idealist one. It exhibits the notions of an 'ideal' within the integrative learning approach, lesser form of the ideal (Specialised approach) and finally a processes of achieving the ideal which involves development from the lesser forms of adaptation to one which is more holistic in approach, but this development is not guaranteed. Considering this evidence it is exceptionally difficult to see how Kolb's position differs from Jung's idealist one and it is firmly believed here that his theory must be interpreted from an idealist position.

Conclusions: Points of divergence and convergence between Kolb and Jung.

The Kolb's presented relationship between Jung's work and his own appears to be extremely dubious. The similarities between types and styles do not withstand close academic examination, the connections which Kolb claims between the two are not supported and connections that can be made are superficial at best. The notion that they represent the same basic psychological characteristics is not supported. What is curious however, is that where Kolb claims his work differs from Jung's it in fact does not. The claimed distinctions between Jung's underlying epistemology of idealism and Kolb's Contextualist epistemology are not supported by the presented evidence. Kolb clearly wishes to distance himself from idealism and the ready criticism that it produces stereotypes, a criticism that would lie heavily on Kolb's learning styles. However, Kolb's work is not contextualist and most closely resembles an idealist or formist approach. Hence, Jung and Kolb's work do appear to be linked not by the types and styles but rather that they both represent an idealist approach.

There are serious implications for Kolb's work due to the fact that Jung's work cannot be used as a basis for Kolb's styles. One of the most important is the implication for the stability of the styles. Kolb argues for the dynamic interplay of styles that allows a person to shift between styles as they learn. By the connections made with Jung's work, the dynamic relationship between the styles is based on the same basic processes as occurs within Jung's types. However, Jung's types are always defined in superior and inferior couplings of types, relationships that are integral to the nature of the styles; the inferior qualities informing the superior qualities and vice versa. It is this dynamic relationship that allows the flexibility and development of Jung's types. Kolb's styles exhibit none of these qualities; his styles are defined only in terms of the dominant functions. The styles are achieved by denying the action of which ever learning mode is score less highly in a dialectic pair. This results in the rigid interpretation of a single ability and due to Kolb's proposed use of possibility processing a single function that will become the dominant approach. Hence the dynamic and flexible

nature of Jung's types cannot be adopted by Kolb for his learning styles, as the learning styles do not exhibit the necessary qualities of inferior and superior action.

The rigid qualities of learning styles are established due to Kolb's styles not exhibiting the qualities of Jung's types. However, the stability of styles is further exacerbated by Kolb's work being based on a similar idealist epistemology as Jung. The definitions of styles do act like stereotypes, categorising students to exclusive areas of ability. Hence the inflexible nature of learning styles are further established.

The image of stable learning styles become one that is more and more difficult to connect with the learning cycle. For the learning cycle demands a dynamic interplay that is denied by the learning styles. The way in which Kolb presents his learning styles means they become more and more closely associated with the abilities of a single learning style, to the detriment of other learning styles. This establishes a situation where moving round any learning cycle would be impossible, for a learner would have established a specialised function in a single area, hence operating in other areas would be actively avoided. A situation that places immense tension of Kolb's intergrated theory of a learning cycle with intergrated styles.

Questioning Kolb's use of Tyler's possibility processing.

Kolb draws on the work of Tyler (1978) to provide an explanation for the stability within his learning styles. Stability is centrally important if learning styles are going generalisable from one situation to another. Kolb cites the stability of learning styles as being a result of patterns of transaction.

> "Stable and enduring patterns of human individuality arise from consistent patterns of transaction between the individual and his or her environment" (1984, pg 63).

The use of Tyler's possibility processing appears to be logical in the justification of stability, as it provides a framework which allows learning styles to be shaped by the individual and be more than a product of genetic inheritance. The problem that is presented is the amount of stability which possibility processing brings with it. Kolb presents Tyler's work as a positive feedback loop for learning. When learning is first engaged with the learner is free (within the confines of their inherited abilities) to engage with the learning environment as they wish. As the learners engage with learning tasks they discover areas in which they perform well, areas where they perform less well. Possibility processing then dictates that the learner will avoid areas where they perform less well and focus attention on areas where they perform well. Hence the next learning task is not freely engaged with, but done so in the light of the previous learning experience. Tyler refers to this as writing our own 'programmes'. Kolb also recognises that learning itself shapes learning.

> "The choices and decisions we make, to some extent, determine the events we live through, and these events influence our future choices. Thus people create themselves through their choices of the actual occasions they live through" (1984, pg 64).

Logically this is going to result in a very high degree of stability, as the effects of the positive feedback loop will get greater over time. The more often a behaviour is engaged with the more likely the behaviour will be chosen again. This is not to deny the fact change can occur, but in order for change in the 'learning programme' to come about there would have to be an exceptionally significant learning experience to 'override' the effect of the previous learning or at least alter it. Thus Kolb's use of possibility processing establishes stability which fundamentally undermines the flexibility necessary within his own theory. His argument that his learning styles are 'stable states' is over emphasised and his styles become essential fixed states.[26]

Kolb use of Tyler's work appears to be somewhat contradictory to his own position on the flexibility of styles: What is ironic however, is that his use of Tyler's work misses the emphasis on individual differences which is central to Tyler's original work. Kolb's uses Tyler's possibility processing as a means of categorising students into groups, a way of forming unified approaches to learning. Tyler's constant aim was to value the individuality of each person and to avoid presenting people as part of a group or unit. Tyler's work is based upon a completely different epistemology to Kolb[27].

> "Pluralism is the order of the day. Like Mao Tse-tung, psychologists are saying, "Let a thousand flowers bloom" (1978, pg 1).

The thousand flowers which Tyler wishes to see bloom, would become just four within Kolb's theory of learning styles (excluding the problematic mixed learning styles, see chapter nine). This criticism may seem harsh at first for Kolb does attempt to place his learning styles in context and recognise that due to 'inherited

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[26] It should be noted that it is not being argued that Kolb's learning styles are in fact traits, as it is acknowledged they are a product of learning and engagement with the one's surrounding and not an innate trait. Also change in learning styles is not being denied but rather the difficulty of such change being acknowledged. The stability developed by the styles is such that it exhibits many of the qualities of traits but they should, despite the stability, be perceived as states. The present author believes that Kolb's use of the the LSI seems to solidify style to the status of traits.

[27] The importance of establishing unified or complementary epistemologies has been highlighted in the discussion of Kolb's and Jung's work.

predisposition' a learner will have a distinct approach. This inherited predisposition together with learning context does give some expression of individual differences. Kolb makes only passing references to the context and fails to examine or explain its implications leaving it as a mere aside. This approach to the study of people is criticised by Tyler, even if it does claim to value the individual.

> "Research on measurement of individual differences constitute a separate stream of scientific work, more or less detached from the main stream of experimental investigation. But here too, the uniqueness of individuals gets lost. Attempts to account for it in terms of combinations of separate trait measurements obtained for an individual never really accomplished this purpose. It seems wrong somehow, for example, to think of a person as so many units of intelligence plus so many units of mechanical aptitude plus so many units of extroversion" (pg 5).

This 'loss of uniqueness' is evident within Kolb's work. Kolb constructs learning styles from various constituent parts, inherited predisposition, learning history, immediate environment, each learning mode and it's relationship with its dialectic opposite. Without doubt Kolb falls prey to Tyler's criticism that constructing such 'types' fails to value the individual.

> "But all of these systems, while they were useful in clinical work and did stimulate considerable research on personality, still failed the need for a scientific study of the psychology of individuality. They were too large, too general" (pg 6).

For Tyler Kolb's learning styles would be 'too large, too general'. Tyler would clearly not perceive that her work on possibility processing was appropriate for the development of learning styles. For while Tyler presents possibility processing as an opportunity for innumerable different individuals to be established based on their personal experiences. Kolb exploits the theory to establish four types,

denying Tyler's desired focus on the individual. Possibility processing was used to explain the stability of the learning styles which Kolb established. However, Kolb presented no 'limits' on the possibility processing's positive feedback. Thus the process that added a degree of stability to each of the learning styles is free to continue feeding back on itself until stability became rigidity and the styles became essentially fixed. A degree of stability is achieved which Kolb attempts to distances himself from, recognising that such stability would limit the possibilities of learning to simply improving ones own style rather than broadening one's learning capacities. Yet such stability is appropriate for the connection of learning styles and degree courses.

Considering this analysis, styles should be viewed as highly stable and resistant to change due to the positive feedback of Tyler's possibility processing. Hence Kolb's work should be critiqued on the basis that the styles are essentially stable. Kolb does argue that his styles are more flexible than this.

> "Ideas are not fixed and immutable elements of thought but are formed and reformed through experience. In all three of the of the theories just reviewed [Lewin's, Dewey's and Piaget's], learning is described as a process whereby concepts are derived from and continuously modified by experience" (pg. 26).

Yet flexibility inherent within this statement is slowly eroded by positive feedback, because experience will lead learners to modify ideas in a set and limited fashion, according to their learning style. The only conclusion that can be reached is that however misguided or in correct the use of Tyler's possibility processing may be, Kolb's interpretations of it lead to essentially fixed learning styles that do not exhibit the flexibility Kolb argues they have.

Further problems with Kolb's work.

The other areas of difficulty are presented in brief below; before they are elaborated upon in the subsequent sections.

- Kolb's presentation of dialect pairs of learning modes vary between them being negatively correlated and independent of each other. Both interpretations of the relationship between dialect pairs cannot exist within a single theory.

- Kolb presents the idea that there are mixed learning styles, but this runs counter to his use of learning mode in the identification of learning styles and 'Possibility Processing' to reinforce those learning styles.

- Kolb provides three basic factors that contribute to the development of learning styles, heredity, learning history and immediate environment. However, Kolb presents no evidence to explain exactly what role each of the three factors plays.

- Kolb argues that he designed the LSI so that it people would respond to it in the same way as they would a learning environment. This claim is not appear to be well founded.

- Use of split brain research - Kolb uses this information to argue that distinct functional areas of the brain represent the biological foundations for the development of learning styles.

Kolb's use of graphs within his research fails to follow a standard rigorous form, which would allow readers to independently interpret the graphs.

The dialectic pairs problem.

Within Kolb's work there are a number of sources of inconsistency, one of the major areas of concern is Kolb's *learning modes* and their relationships within dialectic pairs. Learning modes are the four approaches to learning that are represented within the learning cycle (see pg 19, figure 1.1), each representing one half of a dialectic pair of possible approaches to the learning environment. The LSI establishes a score four each of these four learning modes; the two largest learning mode scores are used to establish a learner's learning style. How these learning modes relate together are centrally important, but Kolb establishes two possible relationships that he uses interchangeably. These contradictory relationships of *learning modes* are not simply a minor inconsistency but one that questions the very foundations of Kolb's work. A close reading of Kolb's work is unable to resolve the relationship, among *learning modes.* They are presented as independent but treated as negatively related when used to measure *learning styles.* The relationships between the two *learning modes* of a dialectic pair are very important. As argued above, within the discussion of Kolb's work in relation to Jung's work, it is the integral relationship between Jung's dominant and inferior functions that facilitates the flexibility of the types. How Kolb expresses the relationship between the *learning modes* is going to directly impact on how stable or flexible his own styles can be. Yet Kolb presents the *learning modes* as both independent and negatively related, a situation that is obviously not possible.

The mutual exclusiveness in the relationship of the *learning modes* of dialectic pairs comes to light during the measurement of *learning styles.* Kolb overtly states that for the purpose of analysis the *learning modes* of the two dialectic pairs will be treated as negatively related (see pg 76, 1984). Although this contradicts the earlier statement that the modes of dialectic pairs are independent (see page 68, 1984), it is an understandable move if Kolb wishes to explore the implications of *learning modes.* That is, if Kolb was simply testing out relationships and investigating how the *learning modes* related together, such a shift in the use of *learning modes* could be justified. However, Kolb does not just 'test the water',

he goes on to develop his notion of *learning styles* based upon treating *learning modes* as negatively related, something that is highly problematic. Even this could be accepted if the problematic nature of *learning styles* were evident from the definitions of learning styles. However, the *learning styles*, once identified, seem to cast aside their tension filled origins and are presented as if they are unproblematic. This results in *learning styles* being perceived as unproblematic and the 'natural' product of *learning modes*; a situation that projects a false image of *learning styles* and ignores the problems associated with identifying *learning styles*. Working with Kolb's *learning styles*, results in a situation where only parts of an individuals abilities are expressed. It must be noted that this is not the case with Jung's types for although Jung readily acknowledges the superior functions of any type this is always cast into perspective by the inferior functions.

It appears that Kolb treats the *learning modes* of a dialectic pair as negatively related purely to produce the *learning styles*. This results in the *learning styles* being cast into serious doubt for Kolb presents them as representing a learner's major abilities within the learning environment; no indication of what other functions a learner may have are expressed. Ultimately learning styles can only be seen as representing part of the learner's ability.

The mixed styles problem.

Within his theory Kolb recognises the possibility of 'mixed learning styles', that is people with approaches to learning that do not perfectly represent a single learning style but a composite of two or more.

> "These so-called 'mixed' types of people, on the basis of what fragmentary evidence we have, seem to be those who rely on the second- and third-order levels of learning. Thus, through integrative learning experiences, these people have developed styles that emphasise the dialectically opposed orientations" (pg 76).

At first this statement appears to be reasonable and one that recognises the range of possibilities within learning styles and even shifts his ideas closer to Jung's notion of Types. Yet on reflection it further casts doubt on the relationships between the learning modes of the dialectic pairs (discussed in the previous section). From this statement it appears that dialectic pairs are not negative; as they have to be in order to develop learning styles. Rather the learning modes are independent of each other and can develop to produce a 'style' that exhibits the qualities of more than one learning style. Thus the learner can shift to an approach to learning which echoes Jung's 'Individuation', that is an ultimate type, a notion that has already been illustrated as being problematic within Kolb's work.

The notion of 'mixed types' introduces an important issue, which Kolb fails to fully explain. Kolb refers to second and third order levels of learning. What is meant by this? As we move onto more sophisticated learning do we adopt higher levels of learning which differ from earlier approaches to learning. Kolb presents the LSI as measuring the primary or elementary approach to learning.

> "The important point however, is that the LSI measures differences only in the elementary knowledge orientations, since the forced-choice format of the inventory precludes integrative responses" (pg 76).

This statement seriously effects learning styles but Kolb fails to further develop it. How do the elementary orientations relate to second and third order orientations? What is meant by elementary orientation? These questions are not answered by Kolb. Implicitly it could be argued that elementary orientation must be the most important or the LSI would be of very little value, or perhaps that second and third order orientations are directly related to elementary orientations and so can be inferred from the results of the LSI. However, none of these questions are answered and so the implications can only be hypothesised.

One possible explanation for Kolb's recognition of the mixed learning style is based on how Kolb generates the learning styles. If a learning mode score is subtracted from the other mode of a dialectic pair and both scores are the same then the learner will be placed on the axis of the graph and not in one of the quadrants. This prevents them from being assigned to a learning style and establishing a notion of mixed learning styles. Hence mixed learning styles are the result of chance in the method Kolb uses in the assigning of learning styles and no more reflects an integrative approach to learning than any other learning style. If this is the case it would seem reasonable for Kolb to produce learning styles for these learners and overtly recognise them within his list of learning styles. Yet Kolb's learning styles focus purely on the four 'simple' learning styles. The notion of the mixed learning style can only be extract from the text itself and is not as visible as the four 'simple' learning styles.

The questions generated by second and third order learning and elementary learning are important, but Kolb fails to actively address them; causing there to be questions over exactly what the LSI measures and it generalisability. For if elementary learning is the dominant approach to learning then the LSI seems to retain a use. However, if elementary learning ability is rarely directly exploited then the use of the LSI becomes exceptionally doubtful. Similar questions are generated around mixed styles and what they represent. These questions are left unanswered and are not even problematised by Kolb. The only reasonable conclusion that can be reached is that Kolb has failed to recognise the

implications of mixed styles and 'second and third order learning'. This results in these contradictions and questions being evident within his theory.

Three foundations to learning styles.

Some of the information Kolb presents to explain his theoretical position, when reflected upon, is of questionable use. Kolb cites the three factors that influence the development of learning styles; heredity, personal history and immediate environment. If heredity is looked at first the researcher is left with the information that genetically approach to learning can vary. While such a position is possible, what use is the information to the educator? Kolb does not expand on the point, from what is presented it is not clear exactly what Kolb means by 'hereditary equipment'(pg 76, 1984). It is taken here that he is referring to some form of genetic information, in a literal interpretation of the word. However, a more loose interpretation is possible, that is Kolb's hereditary equipment is a socially inherited approach to learning; based on the influence of the parents on the child. In all likelihood it is the genetic position that is the most appropriate to explain the phrase 'hereditary equipment'. If the socialisation perspective were used it would be difficult to perceive how heredity equipment differed from personal learning history. At this genetic inherited level it is difficult to imagine how empirical evidence could be gained for such a position. To provide evidence that would do more than simply compare different people's approaches together, separating this from the effect of personal history would be exceptionally difficult.

In a similar way personal learning histories are cited by Kolb as one of the foundationary processes within the development of learning styles. However, Kolb does not explain how to exploit personal histories, what are significant factors within personal histories? It is as if Kolb is say 'learners will have a learning history and this will effect future learning', then tantalisingly leaving the issue. The nearest Kolb gets to citing the actual role of personal history is;

> "Through socialisation experiences in family, school, and work, we come to resolve the conflicts between being active and reflective and being immediate and analytical in characteristic ways" (pg 76-77, 1984).

What can be taken from this is that much of our approach to learning is open to moulding and development by socialisation. At no point does Kolb present evidence for this position. No empirical data is forwarded to demonstrate the link between experience of the environment and future approach to learning. Without such evidence the links, while appearing to be reasonable, even logical, are purely speculative. As the links are left as speculative the use of the knowledge becomes questionable once again. For example, an educational practitioner would not know how to accommodate a learner's personal history within their attempts to enhance an individual's learning. Shaping a learner's present environment to create a given personal history can only be done speculatively as no information is given about this by Kolb. What Kolb presents has a high degree of face validity and exhibits a high degree of logic. Yet ultimately without further information it is of little value when trying to improve learning or shape approaches to learning. While it is felt that few would challenge the point that approaches to learning is effected by previous learning experiences, it is essential that if such a recognition is going to be of practical use. That an understanding is gained about how personal history develops and it's relationship with experience and hereditary equipment be further investigated. As it is, Kolb leaves the relationship totally open and so the recognition of the role of learning history is of little use when trying to develop a deeper understanding of learning based on Kolb's theoretical position.

The final factor in the development of learning history is the immediate environment. Few would deny the immediate environment a role in learners approach, yet it is important to recognise whether learners react to the environment, act upon the environment or a combination of the two? As an answer to this question would aid our understanding of approaches to learning and the development of learning styles. Such a question may be rejected due to its

implicit complexity in filtering out the various influences within learning. The influences on learning are varied and learners' positions may be one of many. It is important however, to recognise that merely stating factors that influence the development of learning does little to facilitate development of understanding. For example, while Kolb acknowledges the role of immediate environment no indication is give as to how the environment plays a role and the learner's relationship with the environment is not explored.

Although Kolb recognises what surely must be important factors within the development of learning styles, because he fails to fully explore the implication of the factors their identification appears to be little more than stating what are logical necessities within learning. No practical benefit can be gain from their identification as their possible influence is left too diverse. Merely stating that heredity, learning history and immediate environment are influential factors in the development of learning styles cause the exact nature of Kolb's learning styles to remain indistinct. What is lacking is a coherent theory of experience, as the lived, the intricate relationship between immediate environment, learning history and heredity. No explanation is given of the dynamic process of learning, that process that can only exist at the point of contact between learner, environment and material. Hopkins (1993) elaborated on this point concluding that although tantalisingly mentioning how experience is contingent and indeterminate, and not open to reduction to a fixed formulae.

> "We hear nothing more from Kolb about contextualism. The reasons seem evident. His theory is itself what he calls in the discussion of Pepper's terminology a "structure of mechanism" that "cannot exist in the contextualist world view". Kolb's theory as a formalistic refection of experiential process cannot withstand phenomenological reflection for the very reasons he sets forth here!" (1993, pg 54.)

Split brain research.

Kolb attributes a considerable section of *Experiential Learning* to biological research (see pg 46 - 58, 1984), especially split brain research that he used to claim a biological grounding for his theory. The main use of this work is to provide evidence for the 'double knowledge' theory. The notion that there are two ways in which the world can be understood, that which is 'understood or comprehended' and that which is 'experienced or apprehended'. The split brain research of Sperry et al (1963), was used to demonstrate that the right hemisphere was not in fact a cognitive 'spare tyre', representing immature and concrete thought, but rather representative of apprehension of experience, which is an equally valid way of responding to the world. At a theoretical level this information may be useful to demonstrate that despite the dominance, in the West of left hemisphere and abstract verbal processing, the right hemisphere has an important role to play within cognition. However, there are considerable consequences of this. Firstly Kolb appears to ignore that the although split brain research did demonstrate differences in processing of information this occurred after severe surgical trauma. Often the reported differences are only manifest under 'strained' experimental conditions. The fact that these differences in processing require such extreme conditions to be demonstrated indicates that normally they are a unified whole that cannot be separated in this manner. Processing is therefore neither left nor right brained but rather a task for the whole brain.

If for a moment it is accepted that the two forms of processing are discrete the second issue of using split brain research comes to light. If each hemisphere represents the processing abilities of the brain, studying the brain's action would somehow give an insight into a learner's style of learning. That is learning styles would be biologically different and would process information differently at a biological as well as a sociological 'learnt' level. (Although Kolb himself fails to state it, it would follow from his own theory that differences in the use of the brain's hemispheres are at the centre of variations in the heredity equipment.) If

this is the case learners should be able to be categorised based on the results of some form of brain scan, such as a CAT scan. Kolb makes no attempt to suggest that differences in processing should be measured at a neural brain level and indeed, no later research has made such an attempt. Admittedly such research would be immensely difficult but if this is the case then whichever process dominates in an individual will correspond to their learning style.

Within the split brain research Kolb presents one other piece of information that is highly problematic.

> "... the conclusion that the two hemispheres of the brain were specialised for two different modes of consciousness - the two different modes of knowing about the world that we are calling apprehension and comprehension" (1984, pg 48).

Kolb's conclusions stated here wildly overstep the evidence. However, there is no contention with the argument here with the conclusions that split brain research has highlighted the fact that the brain's hemispheres process information in different manners. The left hemisphere being associated with processing information in an analytic fashion, the right hemisphere's abilities best being conceptualised as holistic (Levy, 1972). Springer and Deutsch, 1993 note that, "There are other ways of to interpret the differences we have just considered, but the holistic distinction has been the most influential in moving thinking about hemisphere differences away from the verbal - non-verbal dichotomy" (pg 52). The research appears to indicate that the differences between the hemispheres are more focused on how the information is processed rather than as earlier thought, where the focus was on what each hemisphere processed. This, it is argued here, is a reasonable basis for Kolb's claim that approaches to learning should be viewed as 'coequal'. This Abandons the earlier research on the brain functioning (Goldstein and Scheerer, 1941), which presented concreteness in processing of information as a deficit and evidence for brain damage. This position also rejects

Piaget's hierarchical view that presents a development from concreteness to abstractness.

Although this research does provide evidence for importance of the two different modes of processing information, Kolb is not justified in stating that this represents two different modes of consciousness. Consciousness is not merely the sum of our processing abilities. The difficulties of the 'mind-body' problem are reiterated by Springer and Deutsch (1993)

> "... a physiological correlated of some mental event is not identical to the event. Mental life may never be relatable to external measurable physiology - not because it does not arise from brain activity but because what we experience inwardly is not explainable in terms discretely measurable processes" (pg 319).

In his attempt to represent two different modes of consciousness Kolb appears to have been too bold; evidence for consciousness is not present in the cited studies (Feigl, 1958; Sperry, Gazzaniga and Bogen, 1969; Edwards, 1979; Zajonc, 1980). Zajonc's work places great emphasis on thinking and feeling being two separate processes, and that each makes different demands of the performer. Yet, to interpret this as evidence for different modes of consciousness seems to radically undervalue the complexity of consciousness. Also the assumption is made that understanding the brain's differentiation in processing of information equates with understanding of the consciousness. Such an association seems to be unreasonable.

> "... the method by which we are acquainted with consciousness is so fundamentally different from the method by which we aquatint ourselves with brains that I suspect that ... we will never fully understand the connection" (Miller, 1992, p180)

Miller is arguing that much of what has constituted research into consciousness has failed to fully reconcile what we actually know about consciousness with what we confer upon consciousness, based upon our understanding of the brain.

Implications for consciousness.

If split brain studies are taken to be evidence for different forms of consciousness and not different forms of processing, this has considerable implication for theories that are based upon it. Kolb is taking the split brain studies to be evidence for twin modes of consciousness, these different forms of consciousness representing different approaches to the world and reactions to experience. As Kolb is viewing the differences as representative of different forms of consciousness, this implies that the different learning styles based upon these 'consciousness'' exhibit the same qualities.
Atkinson et al (1988) write in their glossary of psychological terms that consciousness demonstrates the following qualities.

> "In short, consciousness has to do with (1) Monitoring ourselves and our environment so that percepts, memories, and thoughts are accurately represented in awareness; and (2) controlling ourselves and our environment so that we are able to initiate and terminate behavioural and cognitive activities"(pg 660).

The monitoring and controlling nature of consciousness, as defined by Atkinson, has strong echoes of possibility processing and top down control. This is where consciousness is controlling the operation and action of the neural operation of the brain. Essentially this is reiterating the interactionist view of consciousness that has gained dominance over the behaviouristic - materialistic position. The earlier materialistic position at its extreme presents consciousness and the brain as one and the same thing (psychophysical identity theory). Once this top down system is initiated actions are engaged with in such a way so as to reinforce the original

system, for although neuro-electro-chemical mechanisms do not initiate the actions, they are called upon to sustain the actions and fulfil the actions of higher levels of consciousness. Ultimately this is providing further evidence for the stability of Kolb's learning styles. Kolb's clearly make the connection between consciousness and learning styles (however flawed the arrival at consciousness may have been). If learning styles are representative of states of consciousness, then they point toward a more stable approach to learning, for consciousness is associated with selective attention and the choice that acts to keep a person within a single domain.

The position Kolb takes upon consciousness not only impacts on the degree of stability of learning styles but also the notion of having a series of differing positions on the experience. Kolb refers to 'dual consciousness' this implies that there are two discrete ways of being aware of oneself and ones surroundings and if a learning style is measured which consciousness does it apply to? No answer to this question is evident within Kolb's work.

The fact that there is evidence for two different ways of processing information does not mean that this represents two different modes of consciousness, in no way are thought processes and consciousness synonymous concepts. If there were two (or more) forms of consciousness Kolb would have to address the relationships between them, for example, are they mutually exclusive forms of consciousness? If not do they exist in parallel, or series? At which level of consciousness do the learning styles act? This statement appears to be ill conceived and not at all supportive of Kolb's theory of learning. Kolb's use of the split brain research does not establish any great support for his theory of learning styles. All that can be taken from the research is that there is evidence that information may be processed in different ways within the brain. Whether these brain processes are distinct like Kolb's learning styles are is not demonstrated by the research, only assumed by Kolb. The use of split brain research is thus greatly over emphasised and at best offers tangential support for learning style theory.

Kolb not only drew on the split brain research to support his theory but also work on the parasympathetic and sympathetic nervous systems. Here Kolb is able to draw on the research of Broverman et al's (1968) on the operation of the two nervous systems and learning. Broverman was able to demonstrate that the parasympathetic and sympathetic nervous systems are associated with different abilities; sympathetic being associated with perceptual tasks, parasympathetic with motor tasks. For this information to be of any use research would have to be undertaken to directly link the systems with the operation of learning styles. No such research has been attempted. It should also be recognised that as with split brain research, the differences in the systems may occur but under ordinary situations 'both' nervous systems are operating together in a unified whole.

In conclusion although Kolb is able to cite a number of areas of neurological and brain research, his approach in gathering theories is somewhat eclectic and does not seem to relate to his own work at anything other than a superficial level. Kolb fails to really tie his own theory to any of this research or even suggest ideas for further research. This leaves the connections between Kolb's work and that of the brain research somewhat loose. Before connections between hemisphere specialisation, nervous systems and Kolb's theory of learning can be established more direct research needs to be undertaken. The connections which Kolb makes do not stand up to rigorous examination. It is not the aim of this study to indicate that there are not connections between learning styles and these biological features but rather that at present the only connections are speculative and the implications of the connections are not fully considered.

The learning inventory problem.

> "...the test should be constructed in such a way that people would respond to it in somewhat the same way as they would a learning situation; that is, it should require one to resolve the opposing tensions between abstract-concrete and active-reflective orientations" (pg 67).

This is the first of the four guide objectives Kolb set himself when designing the learning style inventory. Despite this being a praiseworthy objective Kolb fails to encapsulate it within his test, as the inventory cannot be said to reflect a 'true' learning situation. The problem with the learning style inventory is that it requires the learners to perform only one task and that is an abstract cognitive task. The conflicts which Kolb tries to represent within his inventory are only present in an abstract sense. The pull between active experimentation and concrete experience may be represented by the words, 'pragmatic' and 'intuitive' for example, but this is purely an abstract reflected upon difference based upon the known definition of two words. The actual pull between actively engaging with a task or choosing to reflect upon it is not present within the task. The reflective observation learning mode is represented within the inventory. However, the emphasis is on the ability to reflect as all there is to observe is words, which of course shifts the approach into the domain of abstract conceptualisation. The LSI does not demand that the learners respond in a similar manner to a learning situation; it is simply a self-report inventory.

In defence of Kolb, he does argue that the learners will respond in 'somewhat the same way', not exactly the same way. The practical difficulties that would be faced if all approaches to learning were to be literally present within the test should also be recognised. Expecting a person to actively experiment with information and so on, would at the very least radically increase the completion time of the inventory. It would also make the test more complex to interpret for researchers. Such a change would run counter to Kolb's fourth design consideration, the desire to make the test 'brief and straightforward'(pg 68). Kolb's second design objective also establishes a line of possible defence for the use only of words within his learning style inventory. Basically Kolb argues that "self-image descriptions might be more powerful determinants of behavioural choices and decisions than performance test" (pg 68). The rationale for this claim is based upon Kolb's use of 'Possibility Processing'- which relies heavily on 'conscious choice and decision'. The argument Kolb presents that possibility

processing requires conscious decisions is quite true, but to associate decisions purely with abstract reflection seems to be a limited interpretation of possibility processing. Although ultimately any decision within possibility processing is going to be abstract and based upon reflection of experience, this does not mean the experiences before the decision also have to be abstract. Decisions are made on the basis of all types of experiences. The fact that Kolb presents 'conscious choice and decision' in connection only with 'abstract reflective forced choice self descriptions' limits what can be expressed within the inventory. This is not to imply that what the participants express do not reflect their viewpoint but rather that it represents only one of a possible number of possible positions that a participant could have.

In order for any learner to respond to the demands of the LSI they must have some ability in the assimilator quadrant of Kolb's learning cycle. This is because the comparison of the sets of four words demands that the participant is able to understand the meaning of the word in relation to their learning. Then the participant must reflect on how well this represents their past learning - essentially a process that is assimilative. This task is far from simple, not only must the participant be able to interpret the word but also be able to project that understanding onto their approach to learning.

Even if Kolb had achieved his aim of having all the elements of learning present in the learning inventory in only an abstract sense, the inventory still does not allow learners to respond in 'the same way as they would a learning situation'. A learner may choose to emphasise 'concrete experience' or 'active experiment with ideas' when learning, neither of these two approaches can be accommodated in an abstract form. The learning style inventory would best be described as a method of discovering how learners from different learning styles resolve representations of learning tensions when forced to operate in an assimilative learning style.

Poorly labelled graphs.

From page 81 through to page 92 of Kolb's Experiential Learning (1984) there are four graphs, each displaying information about the position of various factors in relation to the two dialectic pairs. Figures 4.4 and 4.6 labels the horizontal and vertical axes as representing the mean scores of the groups, indicating that the positions of the factors are norm referenced against the data group. Hence on figure 4.4, Nursing students are relatively more convergent in their approach to learning than Economics students. In graphs, 4.3, 4.5 and 4.7 the axes are not labelled as the mean scores of the population, however, they are not the base points of the graph either (i.e. they are not equal to zero). Figure 4.5 for example, has the abstract conceptualisation and concrete experience axis at 3, and the active experimentation and reflective observation axis is also at 3. At first it is easy to conclude that the mean score labels of the two axes is an omission from the graph. However, closer examination of the information displayed on the graphs shows that this cannot be the case.

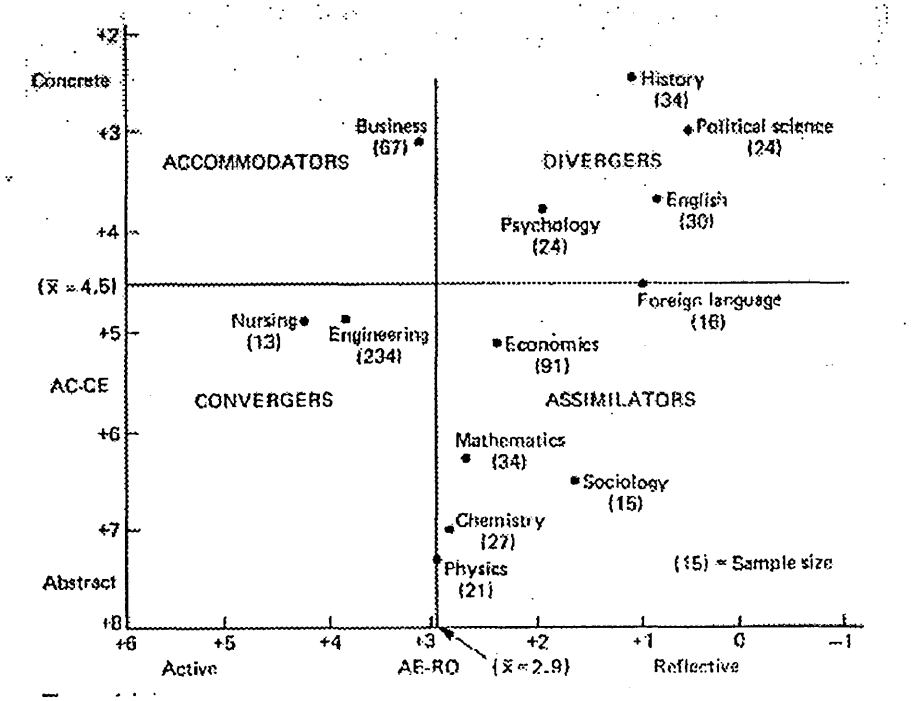


Figure 21.1 Showing Kolb's graph 4.4 from Experiential learning - Average LSI scores on Active reflective and abstract concrete by Undergraduate college major.[28]

[28] The figures presented here are taken from Kolb's *Experiential Learning* (1984) and are presented to show the basic relationship between the data presented upon them and Kolb's

For if the axes did represent the mean score of the population the groups would be divided among the four quadrants, this would be a consequence of the mean scores used. This however, is not the case as all groups apart from the Social Work are left of the vertical axis. Such a biased distribution demonstrates that the axes cannot in fact represent the mean scores of the population. With this knowledge in mind it becomes impossible to justify Kolb's view on the positions of the professional groups from the data provided. From the description of the graph underneath figure 4.5, it appears the data for the graph comes from a number of sources, making it difficult to understand how Kolb was able to construct the graph without establishing some form of population norm reference points or zero points. As has been argued, the lack of labels on the axis cannot be put down to simple omission, as the information displayed does not allow such a conclusion. The omission of the labels nullifies the value of the graph and the associations between professions and learning styles.

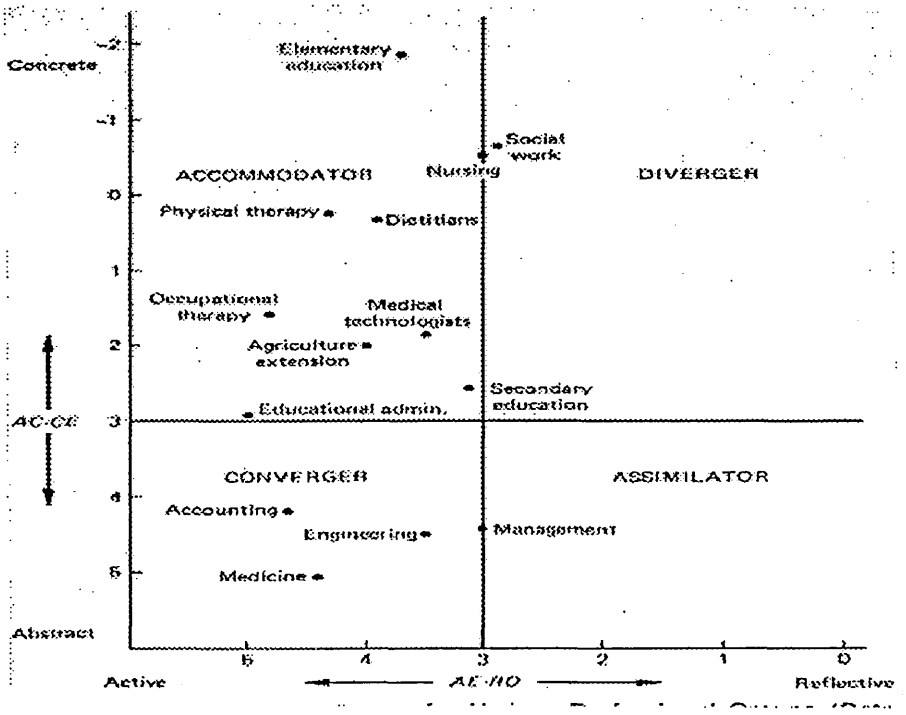


Figure 21.2 Showing Kolb's graph 4.5 from Experiential learning - learning style scores of various professional groups.

labelling of them, they are not to scale and may have suffered minor distortions when they were digitally entered into this work.

A lesser problem with the graphs, but one that potentially also leads to misinterpretation, is the fact that the graphs that label the axes as the means scores of the group must be norm referenced. Hence the learning styles are relative ones. That is, Business students are not Accommodators but rather they are relatively Accommodating compared to the rest of the population. In itself there is no issue with this, as this is the very foundation of norm referencing. However, the *relative* emphasis is lost within the narrative, so Business students become referred to simply as Accommodators. In the text Kolb does highlight the caution should be exhibited when interpreting figure 4.4.

> First, it should be remembered that all the people in the sample are managers or managers to be ... should produce learning styles that are somewhat more abstract and active than the population at large ... Secondly undergraduate college majors are described in only the most gross terms. There are many forms of engineering or psychology. A business major at one school can be quite different from one at another" (1984, pg 86).

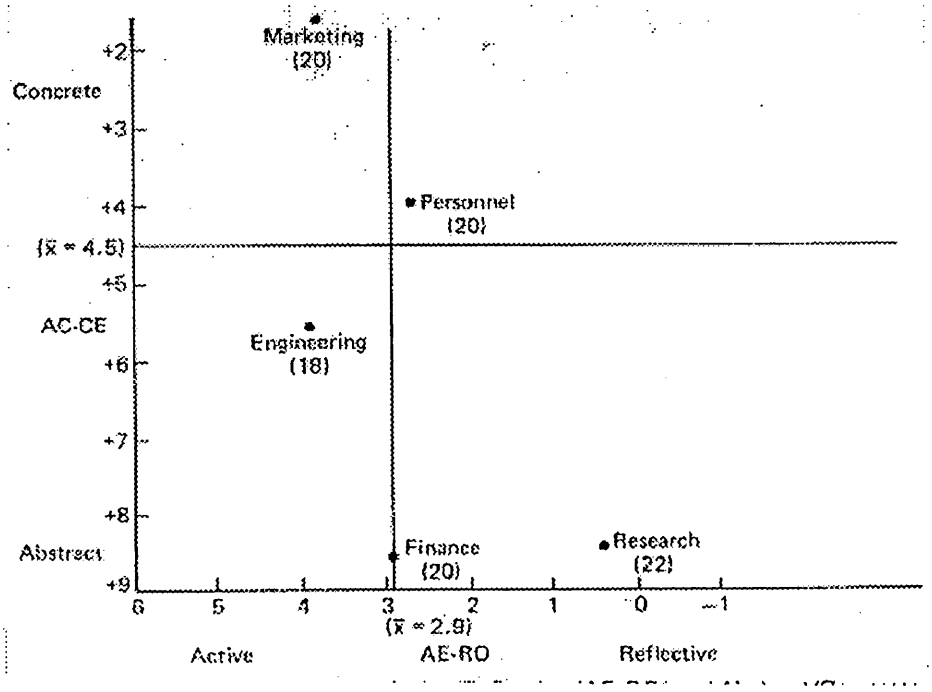


Figure 21.3 Showing Kolb's graph 4.6 from Experiential learning - Average LSI scores on active-reflective and abstract-concrete by organisational function.

The second note of caution seems quite reasonable and seems to hint at the relative nature the identified learning styles. However, the first point appears to be saying that this group may be skewed towards a convergent approach, but the same distribution would be exhibited if a larger more representative population was used. Courses notionally within one quadrant can be very distant from each other - and a course may be closer to a neighbour in another quadrant than a course in the same quadrant. Since we are apparently talking about quadrants defined in a relative rather than absolute terms this matters. Who knows what more rigorous statistical treatments such as analysis of variance would show?.[29]

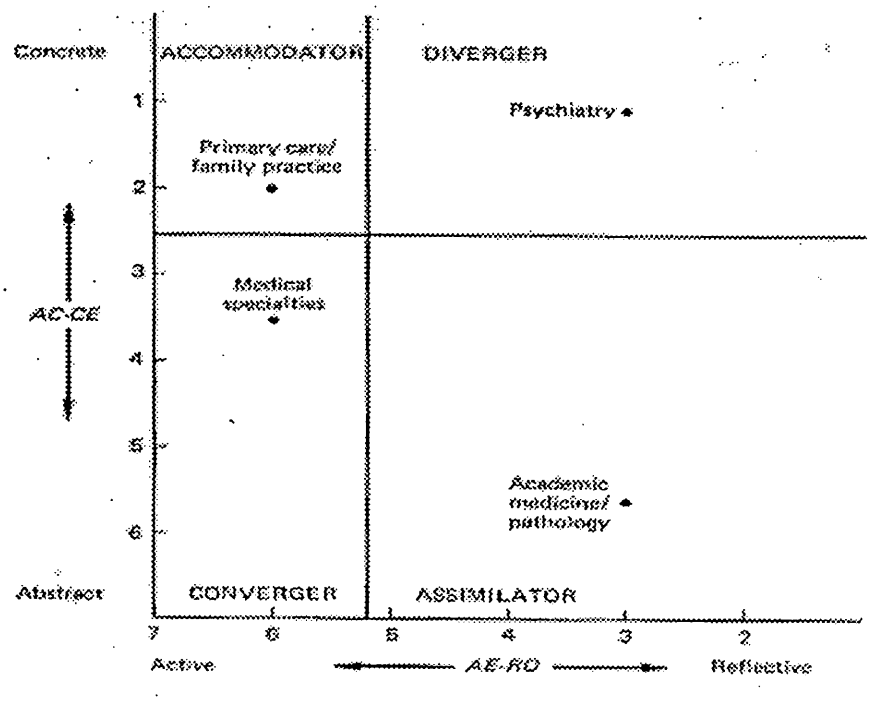


Figure 21.4 Showing Kolb's graph 4.7 from Experiential learning - learning style and senior medical students' choice of speciality.

Overall it is argued here that the these graphs are important for Kolb and the application of his learning styles to the practical learning environment. However, the graphs are open to easy misinterpretation at best, and in case of Figure 4.5

[29] As no figures for each degree course is available, actual difference between the degrees cannot be given but measuring from the graph Economics and Psychology are separated by 8 mm AE-RO axis and 19 mm AC-CE axis; Psychology and History which are separated by 11 mm AE-RO axis and 19 mm AC-CE axis. Indicating a greater difference within the learning style than between it.

very difficult to fully explain. These criticisms question the rigour of Kolb's work and cast doubt on the division of learning styles between degree courses and professional groups.

The impact of these contradictions and problems upon Kolb's work.

The initial impression that is gained from *Experiential Learning*, and Kolb's theory of learning styles, is one of a well grounded and intergrated theory. For each section Kolb presents other theories that are cited as support for his own. The theory is presented as tight and well constructed. However, on closer examination the apparent rigour of Kolb's work falls away. The work of Jung forms the central foundation of Kolb's development and justification of his theory. The links he makes with the work of Jung are unfounded; the subtleties of Jung's work are ignored in favour of gross overall images of Jung's work. It is true the Jung's work establishes different psychological types, which respond to and act upon the world differently and Kolb's aims for his learning styles are exactly the same. It must be acknowledged however, that Jung takes great care to create types that represent both dominant and subordinate functions. Jung also places this within an idealist frame work - something that is necessary to explain the types' shift toward individuation. However, Kolb ignores these subtleties and chooses to attempt to establish connections at a more gross level. He even presents his work as not 'idealist' and his own epistemology is contextual; failing to recognise that rejection of idealism would thoroughly undermine any connections with Jung.

Products of these unsure foundations can be seen in Kolb's contradictory use of learning modes, his development of styles and then attempt to integrate mixed learning styles without clearly explaining the implications that are associated with them. The issues within Kolb's work are not simply limited to the bogus connections he makes with Jung and the consequences of these claims. A contextualist epistemology is claimed but how to interpret the effects of environment are completely ignored, it is simple noted that it will have an effect. Without this information any claims for a contextualist approach cannot be supported. Superficial connections between split brain research are noted, but closer examination reveals that the research provides information that experiences be processed in different ways, but provides no support for the development of learning styles. Various graphs are presented which are misleading and act to

establish a false impression of Kolb's work, especially between the relationship of learning styles and professions. Even the original aims and objectives Kolb worked with to establish the LSI, provide impressive rhetoric but fail to move into practice. After this close examination of Kolb's work, the abiding impression that is left of Kolb's theory is one that fails to stand up to academic rigour. The theory must be viewed with extreme caution and any conclusions reached concerning any aspect of learning style or the learning cycle must be done in line with further research.

CHAPTER TEN: SPECULATIONS AND CONCLUSIONS.

Aims of chapter.

The aims of this chapter are to present the some speculations based upon the results this study has gained combined with the conclusions reached. The work on TLSIS is speculative mainly because it is not clear what constructs constitute these measures and hence it is not know exactly what TLSIS are. The in-depth investigation of TLSIS is outside the remit of this study but later in this chapter possible interpretations of TLSIS are discussed. In light of this it would be unwise to hastily draw firm conclusions. However, the speculations are intended to represent logical progression of this work and possible grounds for further study.

Introduction - TLSIS and students' course grades.

The lack of significant results for the various variables used within this study have already been discussed at length and the implications of these results presented (see Chapter 5). However, the experimental study did generate results that showed significant differences in the students' performance on the degree course. These results not only challenged the present convention of assigning students to learning styles but also established an alternative that can be used in place of learning styles.

Total Learning Style Score and course grade.

As TLSIS exhibited stability it was speculated that it may represent the student's *general ability* in approach to learning. This contrasted with specific learning style scores that may reflect students' ability in a limited area. If this was the case then students with large TLSIS should generally perform better when a broad range of tasks was involved than those with low TLSIS. It has to be emphasised that this was purely speculation and the data generated by the main research were not able to illuminate this issue. In order to investigate this further nursing

students[30] course grades were used. These course marks did not just represent end of year exams but also essays, group projects and presentations, undertaken during the academic year. Hence it was felt that they represented assessment of the students all round performance within an academic institution and not just the specific abilities which exams may assess. The hypothesis was that those students with high TLSIS would attain significantly better grades than those with lower TLSIS. In order to implement this, the group was divided about the median into high and low TLSIS groups.

<u>One-Way Analysis of Variance Of Above median TLSIS degree course grades compared with the below median TLSIS. (For nursing students.)</u>

```
Source     DF        SS        MS        F        p
coding     1         64.0      64.0      5.34     0.037
Error      14      167.8       12.0
Total      15      231.8
                                  Individual 95% CIs For Mean
                                  Based on Pooled StDev
 Level      N      Mean     StDev  ---------+---------+---------+-------
     1      8    54.125     4.016   (-------*--------)
     2      8    58.125     2.800                (--------*--------)
                                  ---------+---------+---------+-------
Pooled StDev =    3.462                 54.0      57.0      60.0
```

Critical value = 4.60 p<=0.05

Key To analysis = Coding - the coding of the degree course grades belonging to the above or median and below TLSIS groups.

The nursing students' course grades were analysed and the results indicated there was a significant difference between the two groups ($F = 5.34$, $df = 1,14$, $p <= 0.05$). However, the small size of the two groups used within the analysis has to acknowledged as limiting the generalisability of the results. The reduction in the size of the groups was caused by the fact that course grades were not planned to be part of the data gathered by the research. In order to assign the course grades to

[30] Nursing students year grades were used because these were readily accessible to the researcher and access to these students as a whole group was still possible. Physiotherapy students for example had taken options and no longer could be accessed as a whole group.

the students, students' post-codes were used to identify their questionnaires. Student records were used to match postcodes with course grades. However, course records were incomplete in many cases which caused a lot of possible data to be lost, as it could not be assigned to specific students. It must be acknowledged however, that although the populations are only small they are evenly matched in size and the results do gain statistical significance. Due to the small size of the population it was still felt that it would not be unwise emphasise these results too highly.

Increasing the size of the group studied.

The other three groups were turned to in order to try and expand the size of the research population. Access to the Psychology and Physiotherapy students' records was not possible, making it impossible to connect students' grades with TLSIS scores. Use of the Statistics students however, was possible. This dramatically increased the size of the groups being studied.

One-Way Analysis of Variance Of Above median TLSIS degree course grades compared with the below median TLSIS. (For combined set of statistics and nursing students.)

Source	DF	SS	MS	F	p
Coding	1	42.2	42.2	3.79	0.059
Error	37	411.5	11.1		
Total	38	453.7			

Level	N	Mean	StDev	Individual 95% CIs For Mean Based on Pooled StDev
1	25	55.760	3.270	(--------*--------)
2	14	57.929	3.452	(-----------*-----------)

Pooled StDev = 3.335

55.5 57.0 58.5

Critical value = 4.10 p<=0.05 (for df = 38)

Key To analysis = Coding - the coding of the degree course grades belonging to the above or median and below TLSIS groups.

The two groups were again analysed using a one - way ANOVA, this analysis did not yield any significant differences, although the F value did approach significance ($F = 3.79$, $p > 0.05$). So it is argued here that the results of the larger group follow the same basic trend as the significant results for the analysis of nursing students.

Interpretation of the association between TLSIS and course grades.

The results of the analysis have shown trends that indicate that larger TLSIS are associated with larger course grades (Yielding statistically significant results for nursing students.) This result is exceptionally interesting, but before more general conclusions can be reached what TLSIS actually represents has to be investigated.

TLSIS is the sum of the four learning mode scores. It was decided to generate the TLSIS so that all of the students' abilities measured by the LSI were represented, for learning styles only represented two learning mode scores. As learning styles do not remain constant between the two assessments, this implicitly indicates that learning modes also change between the two assessments. However, as TLSIS remains stable the learning modes' scores are just redistributed between assessments, not increased or decreased. It can be speculated here that TLSIS represents a 'pool of resources', which is open to be distributed between the learning modes as the task and the learner demands. TLSIS appears to represent a student's general ability and it seems to echo the qualities of the notion of *'g'* intelligence. It is this very notion of a general ability that underlies the TLSIS hypothesis, the idea that someone with a larger TLSIS will perform better than one with a small TLSIS. This hypothesis is supported by the results of the above analysis. The similarities however, extend further than simply this notion of general ability. Cattell (1971) broke *'g'* down via factor analysis into two forms: crystallised and fluid intelligence. Fluid intelligence was described by Cattell as being the basic reasoning ability of an individual and related this ability to the neurology of the brain. Within Kolb's work it could be conjectured that fluid

intelligence could be represented by 'inherited predisposition' that an individual brings to their learning. Whereas crystallised intelligence is represented by the skills valued by the culture in which a learner lives and so allows that person to function effectively within that culture. If culture is defined loosely, then parallels with Kolb can be established. For the immediate learning environment - 'the immediate culture', plays a role in establishing the learning styles of the individual within that culture. However, Cattell went on to make an important connection between the two forms of intelligence. That was that whenever a skill demands problem solving abilities there is always a positive correlation between fluid and crystalline intelligence. Kolb fails to establish these links within his theory, but reasonable conjectural links can be made between TLSIS and performance on tasks which require problem solving skills. The Higher TLSIS have high problem solving abilities represented by their higher course grades. Although it should be noted that the course grades the students gained, reflect their abilities to engage with and solve problems set by their academic course alone. More general problem solving skills may not be reflected in TLSIS; further study is need to evaluation exactly what learning is represented by TLSIS. From the evidence provided by this study, TLSIS appear to represent academic abilities and performance on academic assessments.

The theoretical connection between Fluid intelligence is particularly relevant in light of the results that learning styles shift across time, but TLSIS remain stable. The learning styles may perhaps relate to the crystallised 'culture specific' ability that has been tailored to meet the demands of the environment and tasks, whereas the TLSIS may more closely represent the fluid abilities that are drawn upon to meet the demands of the 'culture specific' environment. The links that are being established here are purely speculative and are aimed at testing the concepts of TLSIS and learning styles. For although the Kolb's interpretation of learning style is firmly rejected by this study, the notion of having different learning abilities for different environments is kept. Learning within specific environments is called here 'learning incident styles'. With learning incidents styles the concept of fluidity is centrally important, for the learner has to be able to shift from one

approach to another as the demands made upon the learner change. Once a shift has been made the actual approach and the learner continues to work within the demands of that environment the abilities become crystallised. The relationship between TLSIS and learning incident styles exhibit strong similarities with the relationships between crystalline and fluid forms of intelligence. It is not argued here that they are the same but rather that initial impressions indicate similarities and further study could profitably direct in this area.

Implications of the association of TLSIS and course grade.

Attune to lecture material not students' learning styles.

The design of this study demanded that learning styles were stable, this allowed presentation of information to learners that keyed into the abilities of their learning styles, the notion of attuning lectures. The learning styles did not display the degree of stability necessary for this attuning to occur. TLSIS did however, display stability between the first and second assessment. It would seem reasonable therefore, to base some form of attunement on this stability. The notion of attunement and TLSIS, however, is wholly inappropriate. As has been noted, learning styles are flexible and are used by the learners in an 'intelligent' manner based on the demands of the environment. TLSIS do not have specific features that could be used as the foundations of attunement. The consequences of attuning lectures to abilities would not be to key into a learner's approach, but rather would force a learner to adopt an approach within the lecture. This is because learners are flexible in their approach and have no preference for the attuned lectures. Students are able to effectively learn in all lectures, hence lecturing to students' learning style has no benefits.

Another form of attunement is possible that could have benefits for the students. If it is accepted that the students are sophisticated and flexible learners, the only other main factor within the learning that can be investigated is the lecture material. If the lecture presentation is shaped to suit the material being presented

the learner will reap the rewards. This will shape the learner's approach, but to one that is most appropriate to engaging with that material rather than any hypothesised personal preference of learning style.

The shift from focus on the abilities and needs of the learners to the material being presented does shift the focus of the study away from a student centred approach to course centred approach. This does not mean the students should be ignored. It should be acknowledge that all four lectures contained the five 'student identified' features of good lectures. Hence the foundations of the lectures do exhibit student centred qualities. However, once this has been done the focus of the presentation should be on how to best present relevant material according to the qualities of the material. Hence the lectures should still be attuned but not to the students learning styles but the demands of the material. Exactly what form this attunement would take is the grounds for further study, but possibilities included diagrammatic approaches, monologues and discussions. These factors focus on the qualities of the material and not the approaches of the students.

The failure of attunement - an important result.

The results of this study may seem unsettling as they overwhelmingly fail to fit the hypothesises presented; the results contradicted the accepted understanding of learning styles. However, the unsettling nature of these results need not be viewed as simply contradictory or destructive. Firstly careful examination of the experimental procedure was undertaken to discover if there was any failing in the experimental procedure that may account for the lack of significant results. No fatal flaws in the experimental design were found; the results reflected the opinions of the research population and were not a product of poor experimental design. If the accepted positions on learning styles and the work of Kolb are adhered to (the concepts that formed the foundations of the original design and hypothesis of this study) the results are problematic. The results show learning styles are not distinct and that the notion of attuning of learning style to lectures provides no perceived benefits. If this original position alone is adopted the results point to short comings in Kolb's theory of learning styles. This is useful, but does not construct anything new to replace the concepts that have been shown to be faulty. However, the results of this study can also address the question of 'If not learning styles then what?'. The results completely reject the whole notion of stable styles, so the idea that learners have a predictable approach to learning can be dropped in favour of a new flexible interpretation of learning. This new interpretation replaces learning style with a general learning ability (TLSIS), and replaces stable learning style approaches with the ability to shift approach, possibly based upon the demands of the learning environment. Thus a learner is liberated from the confining approach of learning styles and is able to react to the varied demands of learning in a dynamic and intelligent manner. Students are freed from the idea that they are simply a product of their learning history, combined with the dubious notion of a 'predisposition' to learning. If this position is accepted the results can be viewed more positively. For not only do the results illuminate the flaws in Kolb's learning styles but also they indicate what can replace those styles and how understanding of learning must change in order to accommodate this more flexible approach.

This study concludes that learning styles must be rejected in favour of TLSIS, which better represent the approach and abilities of students.

Why have the problems with Kolb's work not come to light before?

If the results of this study are accepted it is difficult to understand why Kolb's work has been used and quoted for so long? The main point that goes some way to explain this is the apparent validity of Kolb's work. The flaws thrown up by this study, especially the theoretical ones, came as the result of very close reading and investigation of Kolb's original work. It was only when this was done that problems arose and flaws in Kolb work came to light. What prevented this from happening earlier is the tremendous face validity of Kolb's work; it does not seem reasonable to question something which apparently 'makes sense'[31]. Each of the definitions of a learning style is plausible and acceptable. (It should be noted that the actual different ways in which learning can be approached are not rejected by this study, only the claim that a learner becomes associated with a single approach is rejected.) The definitions of learning styles end up almost like horoscopes, perfectly plausible but no more or less plausible for an individual than another horoscope or learning style. Due to this strong face validity questioning of Kolb's has remained generally dormant.

The fact that learning styles and the categories they represent are easier to deal with than a vast array of different learning abilities reduced the chance that Kolb's work would be questioned. However, as Tyler argues in *Individuality* (1978), such categories come not from the phenomenon itself, but rather from a desire to be able to classify and simplify the phenomenon. For with Kolb's learning styles any classroom is only filled with four types, but if the individual is really valued those

[31] This is not to say that Kolb's work had not been criticised before Romero et al, 1992, questionned the validity of Kolb learning styles and argued for redivised format to be used. Later in 1996, Wilcoxson and Prosser, 1996, also questionned both the reliability and validity of Kolb's LSI, gainning evidence which pointed towards validity of the measure. Such questionning sperodic research has been undertaken but it does not seemed to have impacted on the use of the LSI or questionned the theoretical underpinnings of Kolb.

four types become as many people as there are in the room. Hence a teacher would have to deal with 30 or more individuals and not just four types. It should be noted that this study started by working with Kolb's learning styles not questioning them; only as the study progressed were the original concepts questioned.

The Final Conclusions.

Two main conclusions are reached by this study combined with a speculative investigation of these conclusions:

- Firstly that Kolb's learning styles are not able to differentiate between students' perceptions of lectures.
- Secondly the theoretical grounding of Kolb's experiential learning is exceptionally dubious and his own work (*Experiential Learning*, 1984) frequently exhibits internal inconsistencies.

- Speculative investigation indicates that TLSIS, based on Kolb's learning style inventory, show associated trends with course grades, associations that merit further study.

Within this final section the two major conclusions and speculations will be drawn together, to form a concluding argument.

Considering the experimental results of this research, the use of Kolb's learning styles as a means of gaining insight into a student's approach to lectures (and it would seem reasonable to suggest any academic learning environment) should be abandoned. The fact that a student is labelled a converger by Kolb's LSI gives no insight into their perception of lectures or any information about which learning environments they may prefer. However, learning styles do present information that seems to represent different ways in which it would be possible to approach a learning environment. Learning styles should not be assigned to an individual

learner. Labelling of students as divergers and so on, acts only to limit their possible approaches to learning (the effect of possibility processing) and does not benefit the students. Also it is impossible to attune a lecture to a style that is inherently transitional and in a constant state of flux.

The experiential learning cycle does, however, give a good insight into the possibilities of how learning may be approached. This information should be used not to gain insight into students (as learning styles do) but rather to design effective ways of delivering material. The advantage of using learning cycle information in this way is that the material to be presented is stable and known, unlike the students. Also this research indicates that students perceive all lecturing styles equally well, hence students would not be marginalised by changing the presentation of the lecture to more effectively deliver the material. This present research cannot give any insight into exactly what formats of presentation would best fit what types of material. The attuning of material to lecture styles would be an ideal point to engage in further research, which would examine the connections between presentation styles and material. It should be noted that material may be able to be delivered equally effectively in a variety of styles and if this is the case then this variety should be used to allow students to apply their range of learning skills and avoid reinforcement of a single approach.

Kolb's learning style groups' inability to differentiate between students' ratings and perceptions of lectures are an empirical manifestation of the falsity of Kolb's claim that learning styles represents distinct personality traits of individuals. Theoretically it has been clearly and repeatedly shown that the connections which Kolb attempts to establish between learning styles and Jung's Personality types are unfounded. The surface similarities between the two concepts are quickly shown to be nothing more than that. Fundamentally Kolb establishes a ridged and limiting classification of styles that fails to account for the dynamic nature of personality in the way that Jung's theory is able to do. The lack of significant experimental differences between the learning styles re-emphasises this point. This is further demonstrated by the changes in measured learning styles of participants during the course of the study. This hints at the flexible abilities of

students that are denied by the rigid classification of learning styles. The results of the experimental study thus strongly reinforce the theoretical argument that Kolb's learning styles are not some measure of personality as is assumed. If this was the case then the results of the study should indicate at least some differences in the perception of the experimental lectures between the learning styles, even if these were not in the predicted directions. Thus the theoretical and experimental conclusions converge on a single conclusion that Kolb's learning styles do not represent personality characteristics in the way that Jung's personality types do.

These conclusions lead to the conjecture and brief evidence that TLSISs demonstrate strong trends with degree course performance. This results can be seen as furthering the argument that Kolb's learning styles should be abandoned and forms useful foundations for further investigations. The rationale for the abandonment of the learning styles is that they are theoretical unfounded and in practice of little value. Yet Kolb's definitions of learning styles still appeared to shed light on possible ways of engaging with a learning environment. Theoretically TLSISs rather than give learners just one of these possible approaches to learning (as learning styles do) provides the learner with all the approaches. This frees learners to be able to select the approach that they feel is most appropriate, rather than being limited to a single style approach. What distinguishes learners when using TLSIS is not differences in approach, as would be the case with learning styles but rather overall ability. High TLSIS are associated with attainment of higher course grades not overtly due to differences in approach but rather better general ability, in the same way IQ distinguishes between people. A person with a high IQ need not perform a task differently than another person with a lower IQ; they just perform the task more effectively (often this can be interpreted as meaning quicker). Thus TLSISs do not attempt to comment on learners' personalities and approaches, but rather on their performance as learners. Hence it is argued that TLSISs represents what is left of Kolb's learning style theory when attempts to measure personality differences are removed. It comments on learning ability alone and not how learning is approached or how learning may reflect a person's fundamental personality type.

The flawed theoretical basis for Kolb's learning styles established the question mark above learning styles, the experimental results confirmed the questions conceived by the theoretical work. Learning styles did not reflect fundamental differences in students approaches to learning. Finally TLSIS established a possible new frame work in which to hang Kolb's insights into learning, freeing the work of the flawed associations with personality and developing a purely learning centred approach. Thus the positive elements of Kolb's work are kept, mainly focusing on the actual learning cycle, while the flawed theory of learning style is abandoned.

BIBLIOGRAPHY

Abbey, D.S.; Hunt, D.E. and Weiser, J.C. (1985). Variations on a theme: A new perspective for understanding counselling and supervision. The Counselling Psychologist, Vol 13, Part 3, pp 477 - 501.

Abercrombie, M. (1960). The anatomy of judgements. Harmondsworth, Pengunin.

Abraham, M.R. (1989). Research on instructional stratergies. Journal of College Science Teaching, Vol 18, Part 3, pp 185 - 187.

Abrami, P.C.; Leventhal, L. and Perry, R.P. (1982) Educational seduction. Review of Educational Research, vol. 52, pp446 - 464.

Adeyemi, M. B. (1992). The relative effectiveness of the reflective and the lecture approach methods on achievement of high school social studies students. Educational Studies, Vol.18, No. 1, pp 49 - 56.

Anderson, L. (1984). Lecturing as an absolute form of teaching. HERSDA, Vol 6, Part 1, pp 3 - 5.

Ash, B.F. (1986). Identifying learning styles and matching stratergies for teaching and learning. Educational Studies, Vol 10, No. 2, pp 14 - 28.

Astin, A. (1984). Student Involvement: A developmental theory for higher education. Journal of College Students Personnel, Vol 25, pp 297 - 308.

Atkinson, R.L., Atkinson, R.C., Smith, E.E. and Hilgard, E.R. (1988). Introduction to psychology (Ninth edition.). Harcourt Brace Jovanovich International Edition.

Ausubel, D.P. (1961). Learning by discovery: Rationale and mystique. Bullitin of National Associationof Secondary School Principals, 1961, Vol 45, 18 - 58.

Baker, J.D.; Looke, J.E.; Conroy, J.M.; Bromley, H.R.; Hollon, M.F. and Alpert, C.C. (1988). Beyond career choice: The role of learning style analysis in residency training. Medical Education, Vol 22, pp 527 - 532.

Baker, J.D.; Wallace, C.T.; Cooke, J.E.; Alpert, C.C. and Ackerly, J.A. (1986). Success in residency as a function of learning style. Anesthesiology, Vol 65, Part 3A, A472.

Baker, J.D.; Wallace, C.T. and Cooke, J.E. (1987). Learning style distribution: A consistent relationship between faculty and resididents. Anesthesiology, Vol 67, Part 3A, A564.

Balik, M. J. (1976). Effects of cognitive style on arithmetic achievement in second, fourth and sixth grade school boys and girls. Dissertation Abstracts International, Vol 37, 827 A.

Bennet, S. N. (1976). Teaching styles and pupil progress. London: Open book.

Benton, A.L. (1980. The neuropsychology of facial recognition. American Psychologist, Vol 35, pp 176 - 186.

Bergman, D. (1983). In defense of lecturing. ADE Bulletin, Vol 76, Winter, pp 49 - 51.

Berh, A.L. (1988). Exploring the lecture method: an empirical study. Studies in Higher Education, Vol 13, No. 2, pp 189 - 200.

Berhs, T.H. (1989). The popularity and problems of focus group research. College and university, Vol. 64, Part 3, pp 260 - 268.

Betrand, J.T. (1992). Techniques for analysing focus groups data. Education Review, Vol 16, Part 2, pp 198 - 209.

Bieri, J.; Bradburn, W.N. and Galinsky, M.D. (1958). Sex differences in differences in percetual behaviour. Journal of Personality, Vol, 26, pp 1- 12.

Biggs, J. (1993). What do inventories of students' learning process really measure? A Theoretical Review and Clarification, Vol 63, pp 3 - 19.

Bligh, D. (1984). What's the use of lectures? Harmondsworth, Penguin.

Booth, A. (1993). Learning history in university : Students views on teaching and assessment. Studies in Higher Education, Vol 18, Part 2, pp 227 - 235.

Boud, D. and Prosser, M.T. (1980). Sharing responsibility. British Journal of Educational Technology, Vol. 11, pp 24 - 35.

Boyatris, R.E. and Kolb, D. (1991) Assessing individuality in learning: The learning skills. International Journal of Experimental Educational Psychology, Vol 11, Part 3-4, pp 279 - 295.

Bloom, T. (Ed.) (1956) Taxonomy of educational objectives. New York: David McKay.

Bradney, P. (1957) "The joking relationship in industry". Human Relations 10: 179-87.

Branch, R.C. (1974). The interaction of cognitive styles with the instructional variables of sequencing and manipulation to effect the achievement of elementary mathermatics. Vol 34, pp 4857 - A.

Broverman, D., Kaliber, E., Kobayashi, Y. and Vogel, W. (1968). Roles of activation and inhibition in sex differences in cognitive abilities. Psychological Review, Vol 75, pp 23 - 30.

Brown, G.A. (1982). Two days explaining and lecturing. Studies in Higher Education, Vol 7, Part 2. pp 93 - 103.

Brown, G.A. and Youngman, M.B. (1984) Towards a typology of lecturing styles. The British Jounal of Educational Psychology, Vol 54, pp 93-100.

Brunner, J.S. (1966). Studies in cognitive growth, New York : Jofn Wiley.

Bryant, J., Comiskey, P.W., Crane, J.S., and Zillman, D. (1980) "Relationships between college teachers' use of humour in the classroom and students. evaluations of their teachers". Journal of Education Psychology 72: 511-519.

Bubenzer, D. L. (1976). The relationship of two instructional methodologies and learner variables of information knowledge, locus of control, interpersonal trust and dogmatism. Dissertation Abstracts International, Vol 37, 3411 A.

Butler, J.A. (1992). Use of teaching methods within the lecture format. Medical Teacher, Vol 14, Part 1, pp 11 - 25.

Butler, S. and Roesel, K. (1989) The influence of dress on students' perception of teacher characteristics. Clothing and Textiles Research Journal, Vol 7 (3), pg 57 - 59.

Byrne, D.B.; Hatties,J.A. and Fraser, B.J. (1986). Sudent perceptions of preffered classroom learning environment. Journal of Educational Research, Vol 80, Part 1, pp10 - 18.

Cavanagh, S.J. ; Hogan, K and Ramgopal, T. (1995). The assessment of student nurse learning styles using the Kolb learningh style inventory. Nurse Education Today, Vol 15, pp 177 - 183.

Cashin, W.e. (1985). Improving lectures, Ideas Paper No. 14. Kansas State University Press.

Cattell,R.B. (1971). Abilities: Their structure, growth and action. New York, Houghton Mifflin.

Certo, S. and Lamb, S. (1979). Identification and measurement of instrument bias within the learning style instrument through a Monte Carlo technique. Southern management procedings.

Chickering, A. and Havighurst, R. (1981). The cycle of life. The Modern American College. San Francisco: Jossey - Bass.

Clarke, J.H. (1987). Improving students' fit with academic environment. Journal of College Student Personnel, Vol 28, March, pp 115 - 122.

Clarricoates, K. (1987). Gender and power in the primary school. Cambridge, Polity Press.

Cockburn, B. and Ross, A. (1980). Lecturecraft. Titus Wilson, England.

Corman, B.R. (1957). The effects of varying amounts and kinds of information as guidance in problem solving. Psychological Monographs, Vol 71, pp 431.

Cornett, C. E. (1983). What you should know about teaching and learning styles. Phi Delta Kappa Educational Foundation Bloomington.

Coser, R.L. (1959) Some social functions of laughter. Human Relations 12: 171-81.

Coser, R.L. (1960) Laughter among Colleagues. Psychiatry 23: 81-95.

Cranfield, A. A. and Cranfeild, J. S. (1976). Learning styles inventory. Humanics media, liberty drawer 7970, Ann Arbor, Michigan.

Cummins, J. (1972) Teaching and learning aids. A handbook for tutors and lecturers on the preparation and use of visual aids. National Insititue of Adult Education.

Curry, L. (1991). Patterns of learning style across selected medical specialties. Educational Psychology, Vol 11, Part 3 and 4, pp 247 - 277.

Curtis, B. and Mays, W. (1978). Phenomenology and education : Self consciousness and its development. Methuen : London.

Davis, J.F. (1988). On matching teaching approach with student learning styles: Are we asking the right questions? Paper Presented at The Mid South Educational Research Association Louisville, Kentucky, November, 1986.

Denzin, N.K. (1970). The research act in sociology. London : Butterworths.

Denzin, N.K. (1978). Sociological methods : A Sourcebook, 2nd edn. New York : McGraw-Hill.

Dewey, J. (1938). Experince and education. New York, Macmillan and company/

Domino, G. (1970). Interactive effects of achievement orientation and teaching style on academic achievement. ACT research report, Vol 39, pp 1 - 9.

Downs, V. (1988). An analysis of teachers communication within college classrooms: Use of humour, self disclosure and narratives. Communication Education, Vol 37, Part 2, pp 127 - 141.

Doyle, K.O. (1983). Evaluating teaching. Lexington, MA: Lexington Books.

Dunkin, M.J. (1983) A review of research on Lecturing. Higher Education Research and development, Vol 1, Part 2, pp 63 - 78.

Dunn, R. and Dunn, K. (1977). Educational accountability. Momentum, Vol. VIX, pp 10 - 15.

Edwards, B. (1972). Drawing on right side of the brain. Los Angeles: J.P. Tarcher.
Ellis, J. (1975) "Made in Ealing". Screen 16: 78-127.

Entwistle, N.J. (1987). Understanding classroom learning. Hodder and Stoughton.

Entwistle, N.J. (1984) Contrasting perspectives on learning, in F. Marton et al, The experience of learning, Edinburgh: Scottish academic press.

Entwistle, N.J. (1981). Styles of learning and teaching: An integrative outline of educational psychology, Chichester: Wiley.

Escalona, S.K. and Heider, G. (1959). Prediction and outcome. New York : Basic Books.

Feigl, H. (1958). The mental and the physical, In Feigl et al., Eds., Concepts, theories and the mind body problem, pp 370 - 497. Minneapolis: Uniiversity of Minnesota press.

Feilding, M. (1994). Valuing differences in teachers and learners: Building on Kolb's learning Styles to develop a language of teaching and learning, Vol 5, Part 3, pp 393 - 417.

Fern, E.F. (1982). The use of focus groups for idea generation: The effects of group size, acquaintanceship and moderator response on quantity and quality. Journal of Marketing Research, Vol 19, pp 1-13.

Fink, L.D. (1989). The lecture : Analyzing and improving its effectiveness. New Directions for Teaching and Learning, Spring, Part 37, pp 17 - 30.

Fizzell, R. L. (1982) The status of styles. Paper presented to the Annual Coonference of the Midwest Association of Teachers of Education October 1982.

Fox, R.D. (1985). Learning styles and instructional preferences. Adult Education Quarterly, Vol 35, Part 2, pp 72 - 85.

Freeman, R.D. and Stumpf, S.A. (1978). What can one learning from the learning style inventory? Academy of Management Journal, Vol 21, Part 2, pp 275 - 282.

Freeman, R.D. and Stumpf, S.A. (1980). Learning style inventory: less than meets the eye. Academy of Management Review, Vol 5, Part 3, 445 - 447.

Frehner, V.L. (1973). Cognitive style as a determinant of educational achievement amoungst sixth grade elementary school children. Dissertation Abstracts International, Vol 33, pp 3379 - 3380

French, J.R.P. & Raven, B. (1968) The basis for social power. In D. Cartwright (Ed.), Studies in social power. Ann Arbor, Michigan: University of Michigan press.

Freud, S. (1960) "Jokes and their relation to the unconscious in the standard edition of the complete psychological works of Sigmund Freud, Vol 8, London: Hogarth Press.

Frey, P.W. (1979). The Dr. Fox effect and its implications. Instructional Evaluation, Vol 3, pp 1 - 5.

Fung, Y.H.; Ho, A.S.P. and Kwan, K.P. (1993). Reliability and validity of the learning styles questionnaire. British Journal fo Educational Technology, Vol 24, Part 1, pp 12 - 21.

Gagne, R. W. and Brown, L.T. (1961). Some factors in the programming of conceptual learning. Journal of Experimental Psychology, Vol 65, pp 137 - 141.

Geiger, M.A.; Boyle, E.J. and Pinto, J.K. (1993) An examination of the ipsative and normative versions of Kolb's revised learning style inventory. Educational and Psychological Measurement, Vol. 53, No. 3, pp 717 - 726.

Geiger, M.A.; Boyle, E.J. and Pinto, J.K. (1994) A 3 - year logitudinal-study of changes in student learning styles. Journal of College Student Development, Vol. 35, No. 2, pp 113-119.

Gibbs, G. (1982). Twenty terrible reasons for lecturing. Occasional Paper. SCEDSIP Conference on Education Development, January.

Gibbs, G. & Habershaw, T. (1992). Preparing to teach. An introduction to effective teaching in higher education. Technical and Educational Services Ltd.

Gilbert, N. (1993). Researching social life. London: Sage publications.

Giorgi, A. (1985). Phenomenology and psychological research. Duquesne University Press, Pittsburgh, PA.

Godorov, H.A. (1981). A comparison of two approaches to teaching public speaking at community college level. Dissertation Abstracts International, Vol, 42, 71 A.

Goldman, A.E. and McDonald, S.S. (1987). The group depth interview: princples and practices. Englewood Cliffs, NJ: Prentice Hall.

Grochow, J. (1973). Cognitive styles as a factor of design of interactive decision - support systems. Massachusetts Institute of Technology, Sloan School of Management

Habershaw, T. (1995). The art of lecturing. New Accademic, Spring, pp 5 - 7.

Hale, E. (1964). University grants committee report of the committee on University Teaching Methods. HMSO, London.

Heather, P. and Stone, S. (1985). The C.R.U.S. guide to questionnaire design. University of Sheffield centre for research and user study. University Press.

Hendrix, G. (1947). A new clue to the transfere of training. Elementary School Journal, 48, 391 - 405.

Higginbotham, J.B. and Cox, K.K. (Eds.) (1979). Focus group interviews: A reader. Chicago: American Marketing Association.

Hodgson, V. (1984) Learning from lectures. In Marton, F.; Hounsell, D. and Entwistle, N. The experience of learning. Scottish Academic Press.

Honey, P. and Mumford, A. (1986) Learning styles manual. Published by Peter Honey, Great Britain.

Hodgson, V. (1984) Learning from lectures. In Marton et al. (1984).

Hopkins, R. (1993) David Kolb, Experiential learning machine. Journal of Phenomenological Psychology, Vol. 24, No. 1, pp 46 - 62.

Hudson, L. (1966). Contrary imaginings. Middlesex, England. Penguin Books, Ltd.

Hull, D.B. (1988). Effects of lecture style on learning. Sex Roles : A Journal of Research, Vol 18, Part 7-8, pp 489 - 496.

Hunsaker, J.S. (1980) Experiental learning model and learning style. Journal of Experimental Learning and Simulation, Vol 2, Part 3, pp 145 - 152.

Hunt, D. E. (1978) Paragrapgh completion method, in assessing conceptual level by the paragrapgh completion method. Ontario Institute for Studies in Education, 252 Bloor street, West, Toronto, Ont. M5S 1V6.

Hurt, H.T., Scott, M.D., & McCroskey, J.C. (1978) Communications in the class room. Reading, MA: Addison-Wesley.

Imrie, B.W. (1984). In search of academic excellence : Samples of experience. Paper Presented at International conference on Improving University Teaching, July 4 -7, 1984, at the University of Maryland.

Jackson, M.W. and Prosser, M.T. (1989). Less lecturing, more learning. Studies in Higher Education, Vol. 14, No. 1, pp 55 - 68.

Jacobs, K.W. "Printed handouts at scientific meetings." American Psychologist, April edition, 1981.

Jenkins, A. (1992). Encouraging active learning in structure lectures. In Gibbs, G. Improving the quality of student learning. Published by Technical and Educational Services.

Jensen, A.R. (1980). Bias in mental testing. New York, Free press.

Johnason, L.S. (1987). An investigation of learning styles of baccalaureate student nurses. Unpublished Doctoral Dissertation. University of Illinois.

Johnstone, A.H. and Su, W.Y. (1994). Lectures a learning experience. Education in Chemistry, May, pp 75 - 76.

Jones, S and Jones, A. (1989). Who's to blame. in, Introducing Sociology. (Eds) Bilton, T; Bonnet, K.; Jones, P.; Stanworth, M.; Shread, K and Webster, A. (1990)

Jung, C.G. (1977). Psychological types. R.F.C. Hull, trans. Collected works of C.G. Jung, Vol. 6. Bollingen Series XX, Princeton University Press. pp 12 - 13, 28, 68.

Kagan, J.; Moss, H.A. and Sigol, I.E. (1963). The psychological significance of styles of conceptualisation. In J.F. Wright and J. Kagan (Eds.), Basic cognitive process in children. Monographs of the Society for Research in Child Development, 1963, Vol 28, Part 2, pp 73 - 112.

Kagan, J. (1965) Matching familiar figure test. in, Impulsive and reflective children. In J. Krumboltz, Learning and educational process, Rand McNally - Chicago.

Kagan, N. and Krathwohl, D.R. (1967) Learning stratergies questionnaire, in Studies in human interaction, Washington D.C.: HEW/USOE bureau of research.

Katsuo, T. (1985) Historical development of learning styles inventories. in, Dichotomous cognitive concepts of field dependance and field independance. Evaluation / Feasibility Report held by Educational Resources Information Centre.

Kazerani, E. J. (1978). Inservice education - modular system compared to professor/lecture. Dissertation Abstracts International, Vol 38, 4126 A.

Kegan, R. (1982). The evolving self : Problems and process in human development. Cambridge, MA: Harvard University Press.

Kennedy, J.G. (1970) "Bonds of laughter among the Tatrahumara indians: Towards the rethinking of joking relationship theory" In W. Goldschmidt and H. Hoijer (eds) "The social anthropology of Latin America", Los Angeles: Latin America Studies Centre, University of California.

Kersh, B.Y. (1957). The motivating effect of learning by discovery. Journal of Educational Psychology, Vol 48. pp 391 - 405.

Kiewra, K.A. (1991). Aids to lecture learning. Educational Psychologist, Vol. 26(1)., pp 37 - 53.

Kiewra, K.A.; DuBois, N.F.; Chirstian, D. and McShane, A. (1988). Providing study notes: Comparison of three types of notes for review. Journal Of Educational Psychology, Vol 80, Part 4, pp 595 - 597.

Kittell, J.E. (1957). An experimental study of the effect of external direction during learning on transfer and retention of princples. Journal of Experimental Psychology, Vol 48, pp 405 - 409.

Kline, P. (1991). Intelligence:The psychometric view. Routledge Press.

Kirby, P.(1979). Cognitive style, learning style and transfere skill acquisition. The National Centre for Research in Vocational Education. Columbus, Ohio.

Kolb, D. (1981). Experiential learning theory and the learning style inventory. A reply to Freeman and Stumpf.

Kolb, D. (1984). Experiential learning. Experience as a source of learning development. Prentice Hall International, UK limited, London.

Kolb, D. (1985). Learning styles technical manual: Technical manual. Boston: McBer and Comapny.

Kolb, D et al. (1986). Facilitating experiential learning. New Directions of Continuing Education, Vol 30, pp 99 - 107.

Kohlberg, L. (1969). Stage and sequence : The cognitive developmental approach to socialisation. In Goslin, D.A. (Ed.). Handbook of socialisation theory and research. Chicago : Rand and McNally.

Kruger, R.A. (1988). Focus groups: A practical guide for applied research. Newbury park, CA: Sage.

Kruzich, J.M.; Friesen, B.J. and Van Soest, D. (1986). Assessment of student and faculty learning styles: Research and application. Journal of Social Work and Education, Part 3, pp 22 - 30.

Langer, J. (1978). Clients: check qualitative researcher's personal traits to get more; qualitative researchers:enter entire marketing process to give more. Marketing News, Vol. 12, pp 10 - 12.

Lamb, S.W and Cero, S.C. (1978). The learning styles inventory (LSI). and instrument bias. Academy of Management Proceeding. pp 28 - 32.

Laschinger, H.K. (1986). Learning styles of nursing students and environmental press perceptions of two clinical nursing settings. Journal of Advanced Nursing, Vol 11, pp 289 - 294.

Latterly, D.J. (1976). Cognitive styles, spatial ability and school achievement. Journal of Educational Psychology, Vol 68, pp 36 - 42.

Leftwich, A. (1987). Room for manoeuvre: A reposrt on the experiments in alternative teaching and learning methods in politics. Studies in Higher Education, Vol 12, Part 3, pp 311 - 323.

Levinson, D., et al. (1978). The seasons of man's life. New York. Knopf.

Levy, S.J. (1979). Focus group interviewing, pp 34 - 42, in J.B. Higginbotham and K.K. Cox (eds.), Focus group interviews: A reader. Chicago: American Marketing Association.

Lewin, K. (1951) Feild theory in social sciences. New York : Harper and Row.

Likert, R. (1932). A technique for measuring attitudes. Archives of Psychology, No. 140. (Reprinted in Summers, 1970).

Lovie - Kitchin, J.; Coonan, I.; Sanderson, R. and Thompson, B. (1989) Learning styles compared across health science courses. Higher Education Research and Development, Vol 8, Part 1, pp 27 - 37.

Malcon, P; Lutz, W; Gerken, M and Hoeltke, G. (1981) Learning style identification scale. Publishers Test Service, McGraw-Hill, California

Mamchur, C. (1982). Translating learning style theory into classroom practice: A way of increasing teacher effectiveness through the determination of individual learning styles. Special Report Published by Simon Fraser University U.S.A.

Margerison C.J. and Lewis, R.G. (1979). How work preferences relate to learning styles. Bedfordshire England: Management and Orgainsation Development Research Centre, Cranfield School of Management.

Maroufi, C. (1989). A study of student attitude towards traditional and generative Models of Instruction. Adolescence, Vol 24, Part 93, pp 65 - 72.

Marris, P. (1965). The experience of higher education. Routledge and Kegan Paul, London.

Marrison, D.L. and Frick, M.J. (1994). The effect of agricultural students' learning styles on academic achievement and their perceptions of two instruction methods. Journal of Agricultural Education, Vol 35, Part 1, pp 26 - 30.

Marsh, H.W. and Ware, J.E. (1982). Effects of expressiveness, content covergae, and incentive on multi-dimensional student rating scales: New interpretations of the Dr. Fox effect. Journal of Educational Psychology, Vol 74, pp 126 - 134.

Marton, F. (1975). What does it take to learn? In N.J. Entwistle (Ed.) Stratergies for research and development in higher education, Amsterdam: Swets and Zeitlinger.

Maslow, A.H. (1970). Motivation and personality. Harper and Row.

McClain, A. (1987). Improving lectures: challenging both sides of the brain. Journal of Optometric Education, Vol 13, Part 1, pp 18 - 20.

McCroskey, J.C. & Richmond, V.P. (1983) Power in the classroom 1: Teacher and student perceptions. Communications in education, Vol 32, pg 175 - 184.

Mc Dougal, D. and Corderio, P. (1993). The effects of random questionning expectations on community college students' preparedness for lecture and discussion. College Review, Vol, 17, Part 1, pp 39 - 49.

McKeachie, W.J. (1963). Research on teaching at college and university level, in Gage, N.L. (Ed.). Handbook for research on teaching, pp 1118 - 1172. Chicago, Rand McNally.

McManus, M. (1994). Classroom mangement, natural virtues and the educational of children with emotional and behavioural difficulties. Classroom Management, Vol 3, Part 1, pp 49 - 62.

Menges, R. J. (1977). The international teacher: Controller, manager, helper. Monterey, C.A.: Brooks/Cole.

Mentkowski, C.J. and Strait, M.J. (1983). A longitudianl study of student change in cognitive development and generic abilities in an outcome centered liberal art curriculum. Paper presented at the annual meeting of the American Educational Research Association, Montreal, Canada, April.

Meredith, G. A. (1985) Intimacy as a variable in lecture - format courses. Psychological Reports, Vol 57, pg 484-486.

Merleau - Ponty, M. (1962). The phenomenology of perception. Tr. Colin Smith. London Press.

Merritt, S.L. (1983). Learning style preferences of baccalaureate nursing students. Nursing Research, Vol 32, pp 367 - 372.

Merton, R.K. and Kendall, P.L. (1946). The focused interview. American Journal of Sociology, Vol. 51, pp 541 - 557.

Merton, R.K., Fiske, M. and Kndall, P.L. (1956). The focus interview. Glencoe, IL: Free Press.

Miller, A. (1991). Personality types, learning styles and educational goals. Educational Psychology, Vol 11, Part 3 and 4, pp 217 - 238.

Miller, J (1993) Thinking Aloud. Channel 4 UK TV Discussion programme chaired by Michael Ignatieff.

Moran, A. (1991). What can learning styles research learn from cognitive psychology? Educational Psychology, Vol 11, Part 3 and 4, pp 239 - 245.

Moss, G.D. and Mcmillan, D. (1980). A stratergy for developing problem solving skills in large undergraduate classes. Studies in Higher Education, Vol. 5, pp 161 - 171.

Murray, J.P and Murray, J.I (1992). How do I lecture thee? College Teaching, Vol 40, Part 3, pp 109 - 113.

Murray - Harvey, R. (1994). Learning styles and approaches to learning: Distinguishing between concepts and instruments. British Journal of Educational Psychology, Vol 64, pp 373 - 388.

Myers - Briggs, I. (1962). The Myers - Briggs type indicator manual. Educational Testing Services, Princeton, New Jersey.

Naftulin, D.H.; Ware, J.E. and Donnelly, F.A. (1973). The Doctor Fox lectures: A paradigm for educational seduction. Journal of Medical Education, Vol. 48, pp 630 - 635.

Nance, J.L. and Nace (1990). Does learning occur in the classroom? College Student Learning, Vol. 24(4)., pp 338 - 340.

Newble, D.I. and Jaeger, K. (1983). The effect of assessment and examinations on the learning of medical students. Medical education, vol. 17, pp 165 - 175.

Nulty, D.D. and Barrett, M.A. (1996) Transitions in students' learning styles. Studies in Higher Education, Vol. 21, No. 3, pp 333 - 345.

Oddi, L. (1983). The lecture : An update on the research. Adult Education Quarterly, Vol 33, Part 4, pp 222 - 229.

O'Donnel, A and Dansereau, D.F. (1993). Learning from lectures: Effects of co-operative review. Journal of Experimental Education, Vol61, Part 2, pp 116 - 125.

Onyjiaku, F.O. (1982). Cognitive styles, instructional stratergies and academic performance. Journal of Experimental Education, pp 31 - 37.

Obrdlik, A.J. (1941) Gallows Humour. American Sociological Review 47; 709-13.

Parker, J.K. (1993). Lecturing and loving it: Applying the information-processing model. Clearing House, Vol 67, Part 1, pp 8 - 11.

Palmer, J. (1994) Taking humour seriously. Routledge Press, London and New York.

Pask, G. (1976) Styles and strategies of learning. British Journal of Educational Psychology, Vol 46, pp 128 - 148.

Pascarella, E. (1986). A program for research and policy development on student persistence at the institutional level. Journal of College Student Personnel, Vol 27, pp 100- 107.

Pepper, S. (1942). World hypothesis. Berkley, California : University of California press.

Perry, W. (1970). Forms of intellectual and ethic development in the college years. New York : Holt, Riehart and Winstone.

Perry, W.G. (1981). Cognitive and ethical growth : The making of meaning. In Chickering, A.W. et al (Eds): The modern American college. San - Fracisco : Jossey - Bass.

Perry, C. and Delahaye, B. (1987). Learning styles and students experience in management courses. Higher Education Research and Development, Vol 6, Part 2, pp 175 - 184.

Pervin, L.A. (1989). Personality : Theory and research. Wiley and Sons, New York, 5th Edition.

Plovnick, M.S. (1975). Primary care career choices and medical student learning styles. Journal of Medical Education, Vol 50, September, pp 849 - 855.

Polanyi, M. (1958). Personal knowledge. Chicago: University of Chicage press.

Powell, C. (1983) Paper delivered at the British sociological association working group on humour, Bradford, April 1983.

Powell, L. S. (1978) A guide to the use of visual aids. British Assocication for Commercial and Industrial Education.

Powell, J.P and Andersen, L.W. (1985). Humour and teaching in higher education. Studies in Higher Education, Vol 10, part 1, 1985.

Race, P. (1987). Interactive handouts - turning lecture into learning experiences. CICED Media Centre, Dundee College of Technology.

Radcliff-Brown, J. (1952). On joking relationships and a further note on joking relationships. in, Structure and function in primitive society. London: Cohen and West.

Ramsden, P. (1991). A performance indictor of teaching quality in higher education: The course experience questionnaire. Studies in Higher Education, Vol. 2, pp 129 - 150.

Ramsden, P. (1981). A study of the relationship between student learning and its academic context. Un-published PhD thesis, University of Lancaster.

Ramsden, P. and Entwistle, N.J.(1983). Understanding students learning. London, Croom Helm.

Ramsden, P. and Entwistle, N.J. (1981). Effects of academic departments on students' approaches to studying. British Journal of Educational Psychology, Vol 59, pp 368 - 383.

Ray, V.F. (1945). The contrary behaviour pattern in American indian ceremonialism. South-Western Journal of Anthropology 1: 75-113.

Ray, W.S. (1961). Pupil discovery Vs. directed instruction. Journal of Experimental Education, Vol 2, pp 271 -280.

Reinert, H. (1976) Edmonds learning style identification. In one picture is worth a thousand words? Not necessarily. The Modern Language Journal, vol 60, pp 160 - 168.

Remmers, H. H. (1928) The relationship between students' marks and students attitudes towards instructors. School and Society, Vol 28, 759 - 760.

Remmers, H. H. (1958) On students' perceptions of teachers' effectiveness. in McKeachie (Ed.) The appraisal of teaching in large universities. Ann Arbor: The University of Michigan.

Richards, T. and Aldgate, T. (1983). The best of British. Oxford: Blackwell.

Richardson, J.T. and King, E. (1991). Gender differences in the experience of higher education: quantitative and qualitative approaches, Vol 11, Part 3 and 4, pp 363 - 382.

Riding, R. and Cheema, I. (1991). Cognitive styles - an overview and integration. Educational Psychology, Vol 11, Part 3, pp 193 - 215.

Rogers, C. R. (1983). Freedom to learn : For the eighties. Macmillian Publishing Company, Merrill, U.S.A.

Romero, J.E.; Tepper, B.J. and Tetrault, L.A. (1992). Development and validation of new scales to measure Kolb (1985) learning dimensions. Educational and Psychological Measurements, Vol. 52, No. 1, pp 171 - 180.

Rossum, E.J. and Schenk, S.M. (1984). The relationship between learning conception. Study Strategy and Learning Outcome, Vol 54, 73 - 83.

Rubin, Z. (1981). Does personality really change after 20? Psychology Today, May, pp 18 - 27.

Rule, D.L. and Grippin, P.C. (1988). A critical comparison of learning styles instruments frequently used with adult learners. Paper Presented at the Annual Conference of the Eastern Educational Research Association. Paper No 150.

Rysberg, J.A. (1986). Effects of modifying instruction in college students. Psychological Reports, Vol 58, Part 3, pp 965 - 966.

Saracho, O.N. (1991). Students' preference for field dependance - independance teacher characteristics. Educational Psychology, Vol 11, Part 3 and 4, pp 323 - 332.

Schmeck, R.R. (1988). Learning stratergies and learning styles. Plenum Press, New York.

Schmeck, R.R.; Ribich, F. and Ramanaiah, N. (1977) Inventory of learning processes. in, Development of a self report inventory for assessment of individual learning differences in learning processes. Applied Psychological Measurement, Vol 1, pp 413 - 431.

Schonwetter, D.J. (1993). Attributes of effective lecturing in the college classrom. The Canadian Journal of Higher Education, Vol 23, Part 2, pp 1 - 18.

Scott, W. (1987). Basic concepts in concepts in communication studies. in, Studies in communication, Ed Cashdan, A. & Jordin, M. (1987) Blackwell, London.

Serbin, D. (1987). Gender in the classroom. in, School girl fictions. Walkerdine, V. London, Verso. (1990).

Sevier, R. (1989). Conducting focus group research. The Journal of College Admissions, Winter, pp 4 - 9.

Siegel, L. and Siegel, L.C. (1965). Educational set: A determinant of acquisition. Journal of Experimental Psychology, Vol 56, pp 1 - 12.

Simms, R.R. (1990). Adapting training to trainee learning styles. Journal of European Industrial Taining, Vol 14, Part 2, pp 17 - 22.

Skelton, C. (1993). Women and education. in, Introducing women's studies'. (Eds) Richardson, D. and Robinson, V.

Skinner, B.F. (1977). Beyond freedon and dignity. New York : Knopf.

Skinner, B.F. (1948). Walden II. New York : Macmillan.

Skinner, B.F. (1974). About behaviourism. Jonathan Cape Publishers.

Snow, R.E. and Yalow, E. (1982). Education and intelligence. Chapter 9, in, Sternberg, R.J. Handbook of human intelligence. Cambridge University Press.

Specht, L.B. and Sandlin, P.K. (1992). The differential effects of experiential learning activities and traditional lecture classes in accounting. Simulation and Gaming, Vol. 22, pp 196 - 210.

Spearman, S. (1904). General intelligence: Objectively determined and measured. American Journal of Psychology, Vol. 15, pp 201 - 292.

Sperry, R.W., Gazzaniga, M.S. and Bogen, J.E. (1969). Interhemispheric relationships: The neocortical commissures; syndromes of hemispheric disconnections. in, P.J. Vinken and G.W. Bruyn, eds., Handbook of clinical neurology. Amsterdam: North Holland Publishing, 1969, pp 273 - 89.

Spires, H.A. (1993). Learning from a lecture: Effects of comprehension monitoring. Reading Research and Instruction, Vol 32, Part 2, pp 19 - 30.

Spring, T. D. (1980). A comparison of teacher directed, coventional approach and a student directed, competency-based approach to teaching typewriting at the two year college level. Dissertation Abstracts International, Vol 40, 3718 A.

Springer, S.P. and Deutsch, G. (1993). Left brain - right brain (4th Ed). W.H. Freeman, Press.

Stabell, C. (1973). The impact of a conversational computer system on human problem solving. Massachusetts Institute of Technology, Sloan School of Management.

Stacey, M. (1969). Methods of social research. Oxford: Pergamon press.

Stanton, H.E. (1974). Teaching methods and student personality - the search for an elusive interaction. Instructional Science, Vol 2, pp 477 - 502.

Stanworth, M. (1983). Gender and schooling. London, Hutchinson.

Startup, R. (1977). Staff experiences of lectures and tutorials. Studies in Higher Education, Vol 2, Part 2, pp 191 - 201.

Stewart, D.W. and Shamdasni, P.N. (1990). Focus groups: Theory and practice. Newbury park, CA: Sage.

Stutsky, B.J. and Laschinger, H.K.S. (1995) Changes in student learning styles and adaptive learning competences following preceptorship experience. Journal of Advanced Nursing, Vol. 21, No. 1, pp 143 - 153.

Sugerman, L. (1985). Kolb's model of Experiential learning: Touchstone for trainers, students, counsellors, and clients. Journal of Counselling and Development. Vol 64, pp 264 - 268.

Svensson, L. (1977). On qualitive differences in learning. III - study and learning, British Journal of Educational Psychology, Vol 47, pp 233 - 243.

Swanson, E.J. (1949). Orgainsation and generalisation as factors in learning, transfer and retroactive inhibition. In the University of Minnesota Studies in Education: University of Minnesota Press, Vol 45, pp 9 - 12.

Barbe, W. and Swassing, R. (1979). Swassing - Barbe modality index. Columbus, Ohio: Zaner - Bloser.

Talbot, R. (1985). Situational influences on learning styles. Journal of Industrial and Commercial Training, Vol 1, pp 19 - 28.

Tam, M.; Leung Wong, R and Koo,A. (1993). Improving lectures by using interactive handouts. The British Journal of Educational Technology, Vol 24, Part 2, pp 139 - 145.

Taylor, F.C. (1973). Relationship between student personality and performance in an experiential theoretical group dynamics course. Faculty Working Paper #132, Kent state University.

Terry, R.L and Woods, M.E. (1975). Effects of humour on test performance of elementary school children. Psychology in Schools 12: 591-610

Tinto, V. (1975). Dropouts from higher education: A theoretical synthesis of recent research. Review of Educational Research, Vol 45, pp 89 - 125.

Tierney, D. & Humphreys, F. (1992) Pathfinder 15: Improve your image. The effective use of the OHP. Centre for Information on Language Teaching and Research.

Thornell, J.G. (1977). Individual differences in cognitive style and the guidance variable in instruction. Journal of Experimental Education, Vol 45, pp 9 - 12.

Threadgill, J.A. (1977). The relationship of analytic - global cognitive style and two methods of instruction in mathermatical concept attainment. Dissertation Abstracts International, 1977, Vol 37, pp 5664 - A.

Torrealba, D. (1972). Covergent and divergent learning styles. Massichusetts Institute of Technology, Sloan Schol of Management.

Tyler, L.E. (1978). Individuality. Josey-Bass Publishers, San Fancisco, Washington and London.

Van Cleaf, D.W. and Schkade, L. (1987). Student teacher learning styles: Another dimension of reforms. Teacher Education and Practice: The Journal of the Texas Association of Colleges for Teaching Education. Vol 4, Part 1, pp 25 - 34.

Verse, J. G.; Sims, R.R. and Locklear, T.S. (1991). Improving the reliability of Kolb's revised learning style inventory. Educational and Psychological Measurement, Vol. 51, pp 143 - 150.

Von Franz, M.L. (1971). Jung's typology. NY: Spring Publications.

Walker, L.D. and Inbody, P.W. (1974). A different approach to teaching psychology. Teaching Of Psychology, Vol 1, Part 1, pp 29 - 31.

Walkerdine, V. (1990). School girl fictions. London, Verso.

Wang, M.C., Haertel, G.D. and Walberg, H.J. (1990). What influences learning? A content analysis of review literature. Journal of Educational Research, Vol 84, Part 1, pp 30 - 43.

Ward, V.M., Bertrand, J.T. and Brown, L.F. (1991). The comparibility of focus groups and survey results. Education Review, Vol. 15, Part 2, pp 266 - 283.

Ware, J.E. and Williams, R.G. (1975). Validity of student ratings of instruction under different incentive conditions: A further study of the Dr. Fox effect. Journal of Educational Psychology, Vol. 14, pp 449 - 457.

West, R.F. (1982). A construct validity study of Kolb's learning style types in medical education. Journal of Medical Education, Vol. 57, October, pp 794 - 796.

Whitehead, J. L. (1975). The predictive value of expository verses non-expository methods in teaching selected adult education science classes. Dissertation Abstracts International, Vol 35, 4966 A.

Willcoxson, L. and Prosser, M. (1996). Kolb's learning style inventroy (1985) - review and further study of validity and reliability. British Journal of Educational Psychology, Vol. 66, No.2, pp 247 - 257.

Williams, D.D. (1974). Effects of discovery and exposition teaching methods and focus on control of transfer. Dissertation Abstracts International, Vol, 35, 1495 - A.

Witkin, H.A., Moore, C. A., Goodenough, D. R. and Cox, P. W. (1977). Field-dependant and feild -independant cognitive styles and their educational implications. Review of Education Research, Vol 47, pp 1 - 64.

Wlodkowski, R.J. (1978) Student motivation information form. University of Wisconsin, Milwaukee (available from NEA.)

Worthen, B.R. (1968). Discovery and expository task presentation in elemntary mathermatics. Journal of Experimental Psychology, Vol 59, Part 2, pp 1 - 13.

Wunderlich, R. and Gjerde, C.L. (1978). Another look at learning style inventory and medical career choice. Journal of Medical Education, Vol 53, January, pp 45 - 54.

Zajonc, R.B. (1980). Feeling and thinking: preferences need no inferences. American Psychologist, Vol 35, February, pp 151 - 175.

Ziv, A. (1992) Paper delivered at the tenth international conference on humour. Paris, University of Pairs VIII, July 1992.

Appendices for:

An Experimental Study of Perceptions of Lectures Attuned to Different Learning Styles.

Iain Garner

Appendices.

Methodology Appendix.

Sheffield Hallam University

Lecture Feed Back Questionnaire One.

Please note your postcode _____ and Group _____.

Attitudes towards level of control and style of lecture.

1.Where do you feel the control for progress and content of the lecture lay :-
(please place a cross on the line at the point you feel corresponds with your interpretation of the level of control.)

The lecturer. --- --- --- --- --- --- --- --- --- --- The Student.

Complete control,
Gave no prior information about content of lecture.
Completely based on their ideas

The students set the agenda,
Controlled the speed and contents of lectures
Were able to freely ask questions.

2. Where student or lecturer based on your above answer, what effect does this level of control have on your learning? (please tick in the box corresponding to your answer.)

- ☐ Strongly Enhances.
- ☐ Enhances.
- ☐ No different.
- ☐ Inhibits
- ☐ Strongly Inhibits.
- ☐ Level of control does not relate to my learning.

3. What features of the control within lectures relate to the answer you have given above?

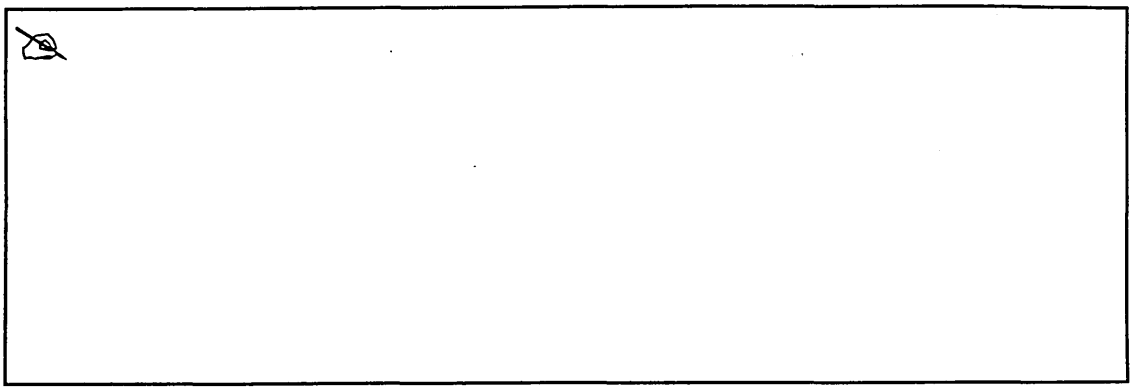
4. If you had to place the STYLE (the way in which the information was presented, not the content) **of the lecture on the continuum below where would you place it?**

More Analytical --- --- --- --- --- --- --- --- --- --- More Holistic.

Serial, compartmentalised,
Point by point.
Clear aims and objectives

Given an idea of the whole area
Idea of inter - related nature of info.
Aims evolve during the lecture.

5. What features of the lecture relate to the above decision?



6. When information is presented in this way, what effect do you perceive it has on your learning?

- ☐ Strongly Enhances.
- ☐ Enhances.
- ☐ No different.
- ☐ Inhibits
- ☐ Strongly Inhibits.
- ☐ Level of control does not relate to my learning.

Attitudes towards the lecture handouts.

7. What did you feel about the content of the handout.

☐ Too much Information.

☐ The correct amount of information.

☐ Just too little information

☐ Vastly insufficient information.

8. How would you describe the style/presentation of the handout?

☐ *Excellent* - exactly what I want from a handout.

☐ *Good* - most of what I require from a handout.

☐ *Average* - a fair handout.

☐ *Poor* - Lacking in certain areas.

☐ *Very poor* - serious lacking in most area.

9. What features of the handout's style caused you to make the above statement?

10. How well do you feel the handout aided the lecture?

☐ They worked exceptionally well together

☐ They worked well together.

☐ They did not effect each other.

☐ They slightly inhibited each other

☐ They strongly inhibited each other.

Attitude towards OHP's/Diagrams/ Examples of the lecture.

11. What did you feel about the content of the OHP's / Diagrams?

- ☐ Too much information.
- ☐ Right amount of information.
- ☐ Just too little information.
- ☐ Vastly insufficient information.

12. How would you describe the style / presentation of the OHP's / Diagrams?

- ☐ *Excellent* - exactly what I want from a OHP / Diagram.
- ☐ *Good* - Most of what I require from a OHP / Diagram.
- ☐ *Average* - a fair OHP / Diagram.
- ☐ *Poor* - Lacking in certain areas.
- ☐ *Very poor* - Seriously lacking in most areas.

13. What features of the OHP's / Diagrams style / content caused you to make the above statement?

14. How well do you feel the OHP's / diagrams aided the lecture?

- ☐ They worked exceptionally well together.
- ☐ They worked well together.
- ☐ They did not effect each other.
- ☐ They slightly inhibited each other.
- ☐ They strongly inhibited.

15. At the end of the lecture what were your *overall feelings* towards the *presentation style.*

☐ *Very Positive* - This is just how I like information to be presented.

☐ *Positive* - This is a fair way to present material.

☐ *Neutral* - I neither liked or disliked the presentation of the material

☐ *Negative* - This is a poor way to present material

☐ *Very Negative* - This is an exceptionally poor way to present material.

16. What features of the presentation caused you to make the above statement?

Overall attitude.

17. Based on your overall feelings towards the presentation style, how well do you believe you learnt during the lecture?

☐ Very well.

☐ Well.

☐ Average.

☐ Had slight difficulty.

☐ Strong difficulty.

18. If you have any other comments which you believe are relevant please note them below.

Very many thanks for completing this questionnaire, your help in this research is much appreciated.

Iain Garner, 1994.

(N.B. Question 17 and 18 did not form part of the analysis for this study due to the poor response rate from the students and it was felt that 15 and 16 covered very similar information).

Design of the lectures.

The lectures themselves were designed around the descriptions of the learning styles given by Kolb and the results of the structured focus groups carried out with the students.

The focus groups were used to gain students opinions of what they perceived to be positive and negative aspects of lectures. The information from these focus groups was exploited in two main ways, it allowed the study to identify base features of a lecture. That is, the requirements that are cited by all learning styles as necessary parts of a productive lecture. If these features were absent from any of the lectures all student learning would be impeded. Secondly, the information could be used as a guide about how to attune the lecture to appeal to a specific learning style.

The base requirements that were identified were as follows:

i. A handout or information sheet to compliment the lecture.
ii. Visual aids, most commonly identified as use of over-head-projector.
iii. An approachable lecture, with whom student felt able to ask questions and seek advice from outside the lecture.
iv. Use of humour to lighten the atmosphere when thing became difficult in the lecture.
v. Use of short break within the lecture to allow people to catch up, reflect on what has been presented and regain one concentration.

These feature formed the foundation of all the lectures that were presented as part of this study. It was within this basic frame work that the experimental variables were manipulated. As noted the responses from the focus groups were also used to identify the experimental variables. However, this was not as simple as identifying the base requirements. It was not the case that the novel responses of a single focus group could be used as an experimental variable, as this may be a completely idiosyncratic response of that group and may not relate to other students perception of learning. What was needed was a feature that was reported frequently but with

different desired emphasis. Two features were identified which fit this criteria (identification of these two variables from student generated data can be seen in appendix for phase one data.), those were level of control within lectures and style of presentation. With these possible themes in mind Kolb's learning style descriptions were studied to discover if these criteria related thematically differently to different learning styles.

Use of Kolb's material in the experimental lecture designs.

The actual outlines of the learning styles Kolb presents are themselves were too detailed to form a basis of a lecture style, in that the descriptions were meant to give an overview of the learning style's overall approach to learning some aspects of which would not be used or would not be appropriate for learning while in lectures. For this reason underlying themes upon which the descriptions were based were studied to discover if they supported the level of control, style of presentations differences identified during the focus groups.

Kolb draws on the work of Jung (1922), and his personality types to develop his own learning styles, exploiting the Jungian dimensions of Intuition - Sensation and Thinking and Feeling, to create his own Kolbian dimensions of Abstract - Concrete and Reflection - Active Experimentation.
These two pairs of dimensions are basically dealing with two subjects, firstly the perception and secondly judgement. As these two dimension make up the foundations of Kolb's work they should also form the basis of the lectures that were to be designed. It was therefore necessary to bring these two dimensions together with the student identified differences to create a lecture style which exploited both the information gathered from the students own perceptions and the theoretical basis of Kolb.

The variables identified by the student population were mapped on to Kolb's learning style descriptions to discover if there was a thematic relationship between learning

styles and the identified variables. This was done by noting any features within Kolb's definition which related to the identified variables. Below are the full definitions of Kolb's learning styles (1984). Highlighted within the definitions are the features which relate to the types of control and presentation style. Control features are in *italics,* presentation features are in *italics and underlined.*

- The convergent learning style relies primarily on the dominant learning abilities of abstract conceptualisation and active experimentation. The greatest strength of these approach lies in problem solving, decision making and the *practical application of ideas.* We have called this learning style the converger because a person with this style seems to do best in situations such as the conventional intelligence tests, where there is a single correct answer or solution to a question or problem (Torrealba, 1972; Kolb, 1976). In this learning style, knowledge is organised in such a way that *hypothetical-deductive reasoning*, it can be focused on specific problems. Liam Hudson's (1966) research on those with this style of learning (using other measures than the LSI) shows that convergent people are controlled in their expression of emotion. They prefer dealing with technical tasks and problems rather than social and interpersonal issues.

Control - Student

Presentation - Analytical

- The divergent learning style has the opposite learning strengths of convergence, emphasising concrete experience and reflective observation. *The greatest strengths of this orientation lies in imaginative ability and awareness of meaning and values. The primary adaptive ability of divergence is to view concrete experiences from many perspectives and to organise many relationships into a meaningful "gestalt".* The emphasis in this orientation is on adaptation by *observation rather than action.* This style is called the diverger because a person of this type performs better in situations that call for generations of alternative ideas and implications, such as "Brainstorming" idea sessions. Those oriented toward divergence and interested in people and tend to be imaginative and feeling-oriented.

Control - Lecturer.

Presentation - Holistic.

- In assimilation, the dominant learning abilities are abstract conceptualisation and reflective observation. The greatest strength of this orientation lies in inductive reasoning and the ability to create *theoretical models*, in assimilating disparate observations into an integrated explanation (Grochow, 1973). As in convergence, this orientation is *less focused on people* are is more *concerned with ideas and abstract concepts*. Ideas, however, are judged less in this orientation by their practical value. Here, it is *more important that the theory be logically sound and precise.*

Control - Lecturer.

Presentation - Analytical.

- The accommodative learning style has the opposite strength from assimilation, emphasising concrete experience and active experimentation. The greatest strength of this orientation lies in *doing things, in carrying out plans and tasks and getting involved in new experiences.* The adaptive emphasis of this orientation is on *opportunity seeking, risk talking and action.* This style is called accommodation because it is best suited for those situations where one must adapt oneself to changing immediate circumstances. In situations where the theories or plans do not fit the facts, those with an accommodative learning style will mostly likely discard the plan or theory and deal with the facts. (With the opposite learning style, assimilation, one would be more likely to disregard or re-examine the facts.) People with an accommodative orientation tend to solve problems in an intuitive trial and error manner (Grochow, 1973), relying heavily on other people for the information rather than on their own analytic ability (Stabell, 1973). Those with accommodative learning styles are at ease with people but are sometimes seen as impatient or "pushy".

Control - Student.

Presentation - Holistic.

Kolb's 'abstract - concrete' dimension was used to develop a variable which related to how the students perceived the presented information and their learning based upon this. This dimension was linked with the presentation of information differences identified by the students. The basic rationale here is that presentation can readily alter the perception of the material (abstract through to concrete) while keeping the basic content the same. Hence the abstract - concrete differences in learning style can be investigated.

The concrete side of the dimension was represented by analytical presentation of information. That is, the information was presented in a clear cut factual format. The lecture content was not extensively problematised and for this reason could be described as being 'dry', as the focus was on the recognised facts or issues within the area not contextualisation of facts or issues. Stereotypically this is the format that science lectures are thought to have, that is a string of central themes or facts that are not really open for debate. (This image can often be very unrepresentative of an actual science lecture.) It was more difficult to create a presentation of information format which could be described as abstract. Logically the notion of an abstract lecture format is impossible but what can be drawn from notion of abstract is the idea that not all information is known or agreed upon. For this reason analytical presentation style was contrasted with an holistic presentation style. This presentation style shifted away from clear cut issues or facts and spent more time considering the possible implications of the information or interpretation of the information. This is not to say issues and facts were not presented but rather that they were subsidiary to the broader more holistic issues.

What has been presented so far is the presentation style of the lecture, that of Analytical and Holistic. The analytical presentation is designed to draw upon and appeal to the same fundamental characteristics that Jung describes as 'sensation', that is appealing directly to a 'sensory mode', so a person of this type deals best with what is known and acknowledged without having to engage in critical re-examination. Kolb interprets this end of the dimension as Concrete, drawing on the same notion of a style which engages most readily with 'hard' information rather than theoretical issues. It is thought that the analytical presentation with its emphasis on 'facts' and

less 'critical' approach to the lecture topics should support the sensory or concrete types in their approach to learning. This contrasts with the holistic presentation style which is aimed at supporting the learning of the Intuition / Abstract type who places a greater emphasis on the overall 'feeling' of a topic and critical implications of a topic. The focus on implications and overviews of the holistic presentation style should hopefully support the abstract characteristics Kolb identifies. The Analytical lecture style should support the Converger and Assimilator learning style in their learning (both scoring relatively high on abstract conceptualisation on Kolb's inventory.). The Holistic presentation style should support the Diverger and the Accomodator. (both scoring relatively highly on concrete experience on Kolb's inventory.)

The reflective - active experimentation dimension of Kolb was linked with the level of control identified by the students. The reflective approach to learning was interpreted as having strong links with the traditional more 'passive' role of students in a lecture. Where the student is expected to take in information which can be 'reflected' on during or after the lecture. This contrasts with the lecture format where students are asked to directly engage with the lecture topic via short question and answer session or group work activities within the lecture, this approach would hopefully support an 'active experimentation' approach to learning. The more 'passive' role of students within the lecture would facilitated by close lecturer control, which meant that the students were dependant upon the lecturer for information and could only engage with the information on the lecturers terms. To create an active experimentation environment the students would be provided with more control over the lecture, by been given an overview of the information to be presented, being provided with structured discussion times and being encouraged to question when ever they felt necessary. The combined effect of this would hopefully be to develop an 'active - experimentational' approach to lectures. The lecture controlled environment should support the diverger and accommodative learning style, the student controlled environment should support the converger and assimilator learning style.

From the above descriptions four types of lecture were developed :

	Style of lecture	Attuned for . .
1	Student control - Analytical presentation.	Convergent learning style.
2	Lecturer control - Holistic presentation.	Divergent learning style.
3	Lecturer control - Analytical presentation.	Assimilator learning style.
4	Student control - Holistic presentation.	Accommodator learning style.

The actual lectures presented.

The implementation of lectures faced a number of issues even before the actual presentation of the lectures, firstly who was going to present the lectures and secondly what were the topics of the lectures going to be.

The first issues had two possible answers to it, the lectures could be presented by a lecture who was identified as having a given lecturing style which fit in with the designs of the study or the lectures could all be given by the same person trained to give lectures in the appropriate style. First impressions indicated that a lecture who already had the required style would be the best option and certainly would fit with the notion that the lectures should be kept as real as possible. However, this approach also created serious problems. Firstly there were pragmatic issues, such as what if the required lecturing styles could not be identified within the lecturing staff ? Would the correct lecturer be available at the correct time? Other serious issues concerned the relationship students build up with lecturers and the dynamics which subsequently occur within the lecture room . If actual lecturers with the appropriate style were used it would mean that each group of students would be studied with four different lectures. With so many lecturers it would be impossible to discern whether the reactions that were recorded were as a result of a particular lecturing style or whether it was due to personality characteristics or other variables established between the lecture and the group. These two areas of concern combined to mean that it was impossible for the actual lectures to be used, theoretically it could introduce enumerate new variables which would be difficult or impossible to account for.

The only option open was for the researcher to present all the lectures. This instantly removed the immense numbers of variables due to dynamics of four different lecturers for each group (sixteen in total for the whole study.) It also removed the practical difficulty of co-ordinating lecturing staff.

Other difficulties however, would have to be addressed these mainly concerned the rapport that is established between lecturer and group. This problem was overcome in a number of way. The Psychology, Nursing and Statistics students were the researchers own students who were taught for either a semester or the whole year.

This meant the experimental lectures could be integrated within the lecture course as a whole and not be compartmentalised into an obvious study block, allowing the lectures to be as close to a 'normal' lecture as possible. In fact many of the students answered essay and exam questions on the topics covered in the experimental lectures, indicating that students did not view them as separate or extra ordinary from the rest of the course. With the physiotherapy students it was not possible to become there tutor and establish an ideal rapport. However, in the end it was possible to present this group six lectures, which allowed two weeks for a relationship to be established between the group and the tutor, rather than just four lectures by a different member of staff who was obviously carrying out some kind of study. To help reinforce the notion that the researcher was just teaching a part of the lecture course the researcher also was the tutor for the seminars which linked with the lectures, giving more time for a tutor group relationship to be established. It was felt that this format allowed the research to get as close as possible to gathering general students perceptions of learning within lectures.

Topic of the lectures.

The actual content of the lectures was the next consideration for the lecture design. Popular conceptions of lectures consider that science lectures and humanities lectures are different due their content as much their presentation style. For example, the chemical periodic table will be taught in a different way the to characterisation within the novels of Emily Brontie, because the subject matter is different. If this point is accepted, this will cause the students to attend to the lectures in different ways. The validity of such a belief is open to debate and will be partly address by the design of this study. Originally the aim of this study was to present the communication studies lectures, which form a part of all degree course during the first year. This would allow the negation of any variables due to lecture content. However, it was noted that it could also produce a weakness within any conclusions which the study wished to develop, that is, the study would be open to the criticism that the styles exploited during the experiment were only appropriate to the humanities area and in particular communications. Other disciplines could argue that features of there subject would

mean that such an approach to lecturing would not have the same effect or even would have a detrimental effect. This point would push the design of the study toward presenting different lecture topics. The presentation of different lecture topics also created problems. Mainly these were pragmatic issues concerning the fact that it had been decided that the best approach to the lecturing was for the researcher to present the lectures. If different topics were going to be presented this would mean that the research would have to be knowledgeable in the relevant areas, physiotherapy and statistics for example. Unfortunately this was not the case. It would have been possible for the researcher to have been coached in the appropriate areas but again this was creating problems. The main issue was that the students may well perceive that the lecturer was not particularly knowledgeable in the area (especially during the student controlled lectures where the students were encouraged to debate and ask questions) having the effect of reducing the lectures credibility, which would almost certainly have an effect on their perception of learning within the lecture.

A compromise situation was sought. It would be possible for the lecturer to present a different set of lectures to the psychology students, this being the researcher's main discipline. This would mean that the other three groups (nursing, physiotherapy and statistics) would be taught the same topic, that is communications. Two advantages are to be found in this design, firstly the effects of the lecturing styles could be studied when the lecture content was substantially different and secondly if it was found that the content of the lecture did effect the students perceptions it would still be possible to compare the other three groups together. Something which would not have been possible had all the lecture contents been different.

Implementation of Lectures.

Once the theoretical design had been developed it was necessary to put these designs into workable practice. The lectures had to meet the base requirements identified by the students. The features which had to overtly designed into the lecturing styles were lecture handouts and visuals aids. The other three features use of humour, approachable lectures and use of a small breaks are not effected by the identified

lecturing styles. The approachability of the lecture is very much a personal judgement of the lecturer by the students and as such this should remain reasonably constant. This is one reason why the design of the study allowed time for the students to assess and develop their perceptions of, and relationship with the lecturer. The use of humour is far to difficult a concept to be designed directly into a lecture, the notion of a lecture footnote which stated "now be funny" would somewhat undermine the spontaneity and may cause any attempts at being humours to be severely reduced. Again it is also note worthy that humour is a very personal thing and it often takes time to appreciate or 'tune into' a persons humour. The rapport that will hopefully have built up by the time the experimental lectures are implemented will allow the lecturer and the students to understand what the other finds humorous hopefully allowing any use of humour to be effective. The short breaks in the lectures were used as just that, a respite from the lecture. No tasks were set during the break or instructions given. This would allow a degree of flexibility in how students regained their concentration or catch up on the lecture material. The three 'base features' discussed so far could be see as standard features to all lectures. Their format does not need to be changed when the style of the lecture changes. However, the use of handouts and visual aids although noted by the students as base requirements of lectures are directly linked with style of the lecture. In that if a particular style is being created it is necessary that this style is reflected in the format of the lecture handouts and visual aids. For example, if the lecture is designed so as to present the information in an holistic manner then a handout which presented the material in short bullet points would contradict and possibly prevent such a style being developed.

Holistic handouts and visual aids?

The very concept of visual aids and handouts reflects a more analytical approach to lecturing. In that the handouts and visual aids regularly present the key notes or concepts for the topic area. The format of the handout means that such notes have to be brief, often condensed down to key words. As such this creates a problem for the

notion of an holistic handout or visual aid, in that the very nature of the 'beast' is more analytical. It was decided however, that it would be possible to play down the analytical features of handouts and visual aids while at the same time enhancing the holistic features. This was done mainly by presenting the information in full prose format rather than purely bullet point notes and highlighting the links between and within the material to reinforce the notion that there were not really discrete elements but rather an inter-linked whole.

Contrasts between Holistic and Analytical Handouts.

In order that the contrast between the analytical and the holistic handouts be clarified an example of each on the same topic has been presented below. In this case the subject of the handouts is 'Language and communication'. The rest of the handouts used in the study can be found in the appendix and exploit the same techniques to establish an analytical or holistic bias. It is worth noting that the handouts, in line with the rest of the study, have present information which is part of the students actual degree and as such should be as accessible as possible. For this reason the experimental design (either holistic or analytical) is compromised to a certain extent, in that if information is best presented as bullet points and doesn't readily convert into a more holistic form, then the information should be presented in such a format even if part of a holistic handout. Syllabus demands occasionally made this the case. The full lecture handouts are presented below and comments concerning the style of presentation is presented in the double lined boxes where appropriate.

Holistic Handout From Communication and Language.

Communication and Language.

This royal throne of kings, this scepter'd isle,
This earth of majesty, this seat of Mars,
This other Eden, demi-paradise;
This Fortress, built by nature herself,
Against infection, and the hand of war;
This happy breed of men, this little world;

This precious stone set in the silver sea,
Which serves it in the office of a wall,
Or as a moat defensive to a house,
Against the envy of less happier lands;
This blessed plot, this earth, this realm, this England...

Taken from the speech of John of Gaunt's speech, King Richard II, Act II, Scene 1, by William Shakespeare.

The above passage has communicate something to you, but what was communicated and how was it communicated?

The possible number of responses to this piece of writing is unlimited, everybody that reads it could gain something different from it.

The start of this handout attempts to instantly set the topic in a wider area of real language. The Shakespearean quote was chosen because it would hopefully bring along with a lot of associated feelings and reactions. Such as memories of dull or exciting English lessons or theatre trips, snobbery or English classics. These emotional reactions help facilitate a notion that the lecture topic is connected with the wider world of language and not isolated academic theory.

WHY ARE THEIR SO MANY INTERPRETATIONS ?

1. Noise.

What would happen if you had to read the original passage while taking note from the OHP on the passage?

2. Contextualisation.

You will have brought some opinions to bare when reading the above passage -

i. The fact that you hated Shakespeare when at school.

ii. The fact you have just seen the play at Stratford.

iii. The notion you believe Shakespeare to be vastly over rated.

Amongst others.

We don't read the passage (Communicate) in isolation. We bring our own opinions and those of the culture to which we belong - For Example :- A Muslim reading Salman Rushdie's 'Satanic Verses' compared to a Christian reading the same text. Their cultures would demand that they have different responses to the text and this in turn would shape what they gained from the text.

3. You were only able to gain anything from the above passage because you are able to read English, in other words you share "common ground", with the writer. If you had difficulty with the passage perhaps this was because your use/understanding of English is different to Shakespeare's and there no longer was true common ground.

The next section of the handout presents the theory associated with the reactions to the piece of writing presented, that of noise, contextualisation and common ground. In order to tie these theoretical concepts within a holistic frame work strong use of everyday examples was used, such as the Satanic Verses example. This strong use of examples introduce the concept that the theories are part of, and relate to all language and indeed that the students will have already experienced these concepts but have been unaware of the theoretic bias. This keeps the focus of the lecture one the interconnected whole that is language.

When we speak or write using language we are able to convey meaning, but where is the meaning in language.

Any language can be broken down into it's elemental parts

1. Phonemes - that is the elementary sounds of the language, such as the soft "sh" sound in English or the "W" sound of wooden.

2. Morphemes - come in at a slightly higher level, these are the minimum meaningful forms of a language. In over simplified terms morphemes are simple words, such as dog, cat, exam and so on.

3. Grammar - once an established reserve of morphemes has been created rules of combination have to be drawn up - this is basically what grammar is. There are two forms of grammar - Morphological Rules : Rules for the construction of words.

Syntactic Rules : a set of rules for the construction of sentences.

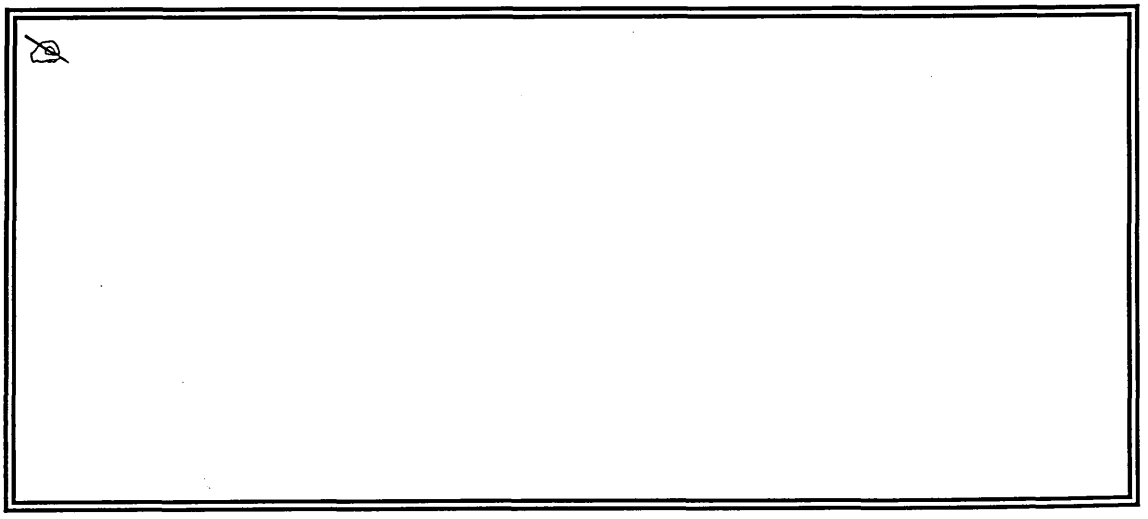
Knowing all this information allows a person to engage in linguistically analysis.

1. This allows a person to understand operation of a language
2. It does not allow a person to fully understand the meaning of language

When reading the speech above I would suggest that no one consciously thought about any of the above - No one will have consciously thought "That's a "Sh" sound or even that's the word England". Even though you will have to be able to do both of these in order to be able to read the passage.

Try now, without turning back, to recall the passage. What was it about?

Make notes in the box below.



Now glance back at the passage, how good was your recall :-

a. For **Linguistics** - the actual words and phrases used.

b. The **Semantics** or general meaning of the piece.
We tend to be much better at semantic than linguistic recall - after all communication is about conveying meaning to one another, not an exchange of linguistic structures.

The above section of the handout deal with the elements that make up language. As such this is a hierarchical structure which builds from simple elements to complex structures. It seemed most appropriate therefore, to present the information in such a hierarchical form, that is from phonemes through to grammar. As these feature refer to distinct elements within language itself, it was therefore appropriate for structure of the handout to reflect these distinctions in order that clarity could be maintained. Despite these reasonable justifications of the use of a more analytical format it was necessary to shift the emphasis back towards an holistic approach. This was done by presenting the theory in action and asking the students to recall what they could about the extract of Shakespeare. This emphasised that the theory was not part of language usage but how language actually operates. Thus bringing into focus the contrasts between linguists and semantics via personal experience, which approximates a more closely a holistic approach to the presentation of these topics.

A Closer Look at Semantic analysis.

a. The simplest form of semantic analysis is the Utterance - the single word statement - Yes, no, perhaps and so on. Usually very straight forward and not open to much misinterpretation.

b. The next stage of analysis is the Locution - which is words placed in some sort of sequence - a sentence with a particular meaning. (It is at this stage that misinterpretation can occur.)

When working at this semantic level five types of meaning can be conveyed? According to Searle, 1979.

1. Representatives.
2. Directives.
3. Commissives.
4. Expressives.
5. Declarations.

It is the listeners job to decide which of these five intentions actually motivated the speaker's utterance. The decision is aided by any "*Common Ground*" that might be shared.

Once the topics had been introduced it was necessary to expand on the concept of semantics, so the students were aware theoretical background of semantics. This information was presented in a more analytical format, as the holistic nature of semantics had already been demonstrated. Plenty of examples of locution were presented by the lecture so the students could annotate their handouts where they felt it was necessary. The examples were not included on the handout itself because of space constraints, adding examples for all points would result in the handout becoming overly large and difficult to scan during the lecture. The examples given by the lecture would allow the students to note the ones which explained the concepts in the most relevant and accessible manner for themselves. Allowing them to perceive the concepts in the 'whole' which they understand as language.

Adding To Language.

Using the original passage again think how differently the information could be presented in a production by different actors - the original 'luvvie' Sir John Geilgud or John Goodman from Rosanne. The words would be the same but would the message remain constant?

Not all verbal communication is expressed in words and sentences; communication can also be made through vocal sounds and modifications that are not considered language but nonetheless convey meaning. These sounds are called **Paralanguage.** The study of paralanguage is concerned with how something is said rather than what is said. Examples of Paralanguage include speech modifiers such as **pitch, rhythm, intensity and pauses,** as well as vocalisations such as **laughing, crying, groaning, sneezing and snoring.** Each of these paralanguage elements can convey meaning. The person who yawns while you are talking, for example, conveys a clear message of boredom; less obviously, perhaps, the person who speeds up his or her speech while talking to you may be conveying anxiety or excitement.

The information on paralanguage was presented in a prose format which aimed at reducing the compartmentalised image that is created by bullet points, while facilitating a holistic image. However, it was recognised that there were certain important concepts which the students had to note, for this reason bold text was used to add emphasis to the appropriate terms and points. Again this was due to the 'balancing act' that was necessary within the experimental design between adherence to the experimental concepts of presentation and the requirements of the lectures to present information in an accessible format for the students.

COMBINING OUR COMMUNICATION.

i. When we communicate we do not just use a single channel we use many channels in series especially the verbal and the NV communication channels. As noted in earlier lectures often people are not aware of what they are communicating NV.

ii. The ways in which communication channels combine is investigated by two models, the Equilibrium and the Arousal Model.

The Equilibrium Model - was proposed by Argyle and Dean (1965).

a. The model proposed every interpersonal encounter engenders pressures towards both approach and avoidance; a person may seek friendship or security while at the same time fearing rejection.

b. Depending on the situation, an appropriate balance or state of equilibrium, will be established by regulation of the non-verbal channels of communication.

c. Equilibrium can be disturbed, for example, when one person presses for more intimacy than the other wants, the latter person will alter the message conveyed through some non-verbal channels to restore the equilibrium.

Thus the basic assumption for the model is that loss of equilibrium created by a message conveyed through on channel can be compensated for by alterations in the messages sent through other channels - in other words, the model proposes a set of compensatory functions.

To test this model, Argyle et al manipulated one of the communication channels and looked at the effect this had on the other channels of communication.

For example if an interview asks increasingly more personal questions the respondent will reduce the amount of eye contact.

Research that goes against the equilibrium model note that the model appears to only closely fit the behaviour of men. Women's behaviour patterns do not fit into this model. (Aiello, 1977)

A further problem for the equilibrium model is the fact that compensation is not the only response to a change in equilibrium. Sometimes an increase in the level of intimacy initiated by one person is reciprocated rather than avoided.

To try and account for this problem with the equilibrium model, Patterson (1976) proposed the Arousal model:-

1. Small changes in intimacy will not be notice and hence no behaviour changes will occur.
2. At some threshold point, however, a sufficient change in the level of intimacy of the interaction will be noticed, and consequently some behavioural adjustment will be necessary.

The precise adjustment that will be made however, depends on the way one labels the state of arousal. The situation can be label either positive or negative, depending on the circumstance.

The Arousal model of intimacy incorporates the equilibrium principles proposed by Argyle et al (1965) but adds another dimension as well. This model permits us to predict that a change in the behaviour of one person may lead to a variety of reactions in the other person depending on situation factors.

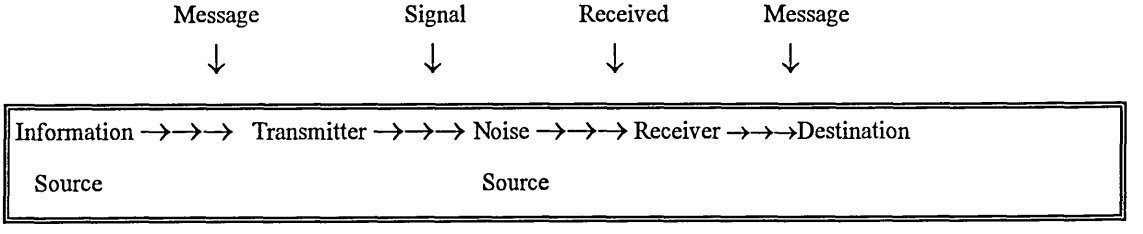
The final section of the handout placed the information that had been presented in a more academic framework by showing information actually combined in a action. Before the section of the handout was discussed the lecture went and talked to a few students while the others watched. During these conversations the lecture stood overly close to the student causing them to either withdraw or avoid eye contact. These conversations were then used during the explanation of the equilibrium. The actual notes on the handout are structured in a more analytical fashion which mirrors the structure and of the theories themselves. The references to the enacted example of the theory negated the possibility of the presentation becoming too analytical.

Analytical Handout from Communication and Language and lecture.

Sheffield Hallam University

MODELS OF COMMUNICATION AND LANGUAGE.

Communication theorist have attempted to develop various models which represent the communication process. An early and influential model in this field was Shannon and Weaver (1949)



According to this model of communication, five components are necessary for communication to occur:

1. Source.
2. Transmitter.
3. Channel.
4. Receiver.
5. Destination.

i. To this Shannon and Weaver introduced the concept of **Noise** - Basically this was defined as any disturbance that interfered with transmission.

ii. Later a Feedback Loop was added, which attempted to deal with the fact that the receiver may not always receive the same message that the transmitter has sent.

PROBLEMS WITH THIS SIMPLE MODEL.

The one way assumption.

1.0. According to this model communication is a one way street, in which the sender transmits a message and the receiver passively receives the message.

1.1. It is rare that communication is so one sided.

1.2 Communication is at least a two way process.

A problem of isolation.

2.0. In this early model the sender and receiver exist outside of social context.

2.1. This has been called the Expectations Affect (Krauss and Gluckberg, 1977) or the Communication Game (Higgins, 1981). For example if you were asked about this lecture, would you respond in the same way to the university principal as you would to one of your flat mates ?

2.2. If communication is to flow most effectively, speakers must share "Common Ground". In other words , the participants must share certain beliefs and suppositions that will enable them to co-ordinate their communicative efforts. (Clark, 1985).

The analytical handout introduced the concept of communication and language with Shannon and Weaver's early model of communication. This instantly split language and communication up into its component parts, showing the implicit operation that occurs within any communication exchange. The information was kept at the level of component elements to reinforce the analytical approach that the presentation was

adopting. The use of examples was exploited to clarify points e.g. the communication game was clarified with an example. To not have done so would have undermined the effectiveness of the lecture which was a prime consideration for all the lectures.

TALKING ABOUT COMMUNICATION.

The Hierarchy of Language.

1. Phonemes - that is the elementary sounds of the language, such as the soft "sh" sound in English or the "W" sound of wooden.

2. Morphemes - come in at a slightly higher level, these are the minimum meaningful forms of a language. In over simplified terms morphemes are simple words, such as dog, cat, exam and so on.

3. Grammar - once an established reserve of morphemes has been created rules of combination have to be drawn up - this is basically what grammar is. There are two forms of grammar - Morphological Rules : Rules for the construction of words.

Syntactic Rules : a set of rules for the construction of sentences.

Knowing all this information allows a person to engage in linguistically analysis.

1. This allows a person to understand operation of a language
2. It does not allow a person to fully understand the meaning of language

The presentation of information about the structures of language follows a rigidly analytical format. In that it elucidates only the central elements with the structure of language. The examples given within this section by the lecturer reaffirmed each of the concepts, that is more phonemes sounds were given and examples of various forms of grammar. The examples were kept within a strict theoretical framework to help emphasise an analytical approach.

To understand the meaning - *Semantic Analysis* - is required.
What is semantic analysis?

a. The simplest form of semantic analysis is the Utterance - the single word statement - Yes, no, perhaps and so on. Usually very straight forward and not open to much misinterpretation.

b. The next stage of analysis is the Locution - which is words placed in some sort of sequence - a sentence with a particular meaning. (It is at this stage that misinterpretation can occur.) What types of meaning can be conveyed ?
There are five possibilities (According to Searle, 1979).

1. Representatives.
2. Directives.
3. Commissives.
4. Expressives.
5. Declarations..

It is the listeners job to decide which of these five intentions actually motivated the speaker's utterance. The decision is aided by any "*Common Ground*" that might be shared.

Semantics is dealt with here in a purely academic way, that is focusing on the theory upon which semantic theory is founded. Utterance and Locution are dealt with in turn to resolve the area into its simplest constituent parts. The issues are not possibly 'clouded' by the addition of real world examples, as was the case in the holistic version of the handout.

Paralanguage.

Not all verbal communication is expressed in words and sentences; communication can also be made through vocal sounds and modifications that are not considered

language but nonetheless convey meaning. These sounds are called **Paralanguage.** The study of paralanguage is concerned with how something is said rather than what is said.

Examples of Paralanguage include

speech modifiers : pitch
rhythm
intensity
pauses

Vocalisations : laughing
crying
groaning
sneezing
snoring.

Each of these paralanguage forms can convey meaning. e.g. Yawns while convey a clear message of boredom..

Paralanguage is divided up into key words and the prose surrounding the area kept to a minimum, allowing the focus of the presentation to be on the basic elements themselves. Here the analytical presentation differed from the holistic handout in the types of examples given by the lecture to support the points being made. In the analytical lecture the expansion of points and examples concerned the concepts themselves. For example, pitch was further described as quality of the sound or tone, hence keeping the information within a theoretical framework. Where as the examples in the holistic lecture focused on how pitch operated to change meaning, such as with "Oh, No."

COMBINING OUR COMMUNICATION.

i. We often communicate using several channels at the same time. Such as verbal and non verbal channels.

ii. Combination of communication channels is investigated by two models, the Equilibrium and the Arousal Model.

The Equilibrium Model - was proposed by Argyle and Dean (1965).
a. The model proposed every interpersonal encounter engenders pressures towards both approach and avoidance; a person may seek friendship or security while at the same time fearing rejection.

b. Depending on the situation, an appropriate balance or state of equilibrium, will be established by regulation of the non-verbal channels of communication.

c. Equilibrium can be disturbed, for example, when one person presses for more intimacy than the other wants, the latter person will alter the message conveyed through some non-verbal channels to restore the equilibrium.

Loss of equilibrium created by a message conveyed through one channel can be compensated for by alterations in the messages sent through other channels - the model proposes a set of compensatory functions.

To test this model, Argyle et al manipulated one of the communication channels and looked at the effect this had on the other channels of communication.
E.G. An interviewer asks increasingly personal questions - the respondent will reduce the amount of eye contact.

Contrary evidence suggests that the model appears to only closely fit the behaviour of men. Women's behaviour patterns do not fit into this model. (Aiello, 1977)

A further problem for the equilibrium model is the fact that compensation is not the only response to a change in equilibrium. Sometimes an increase in the level of intimacy initiated by one person is reciprocated rather than avoided.

To try and account for this problem with the equilibrium model, Patterson (1976) proposed the Arousal model:-

1. Small changes in intimacy will not be notice and hence no behaviour changes will occur.
2. At some threshold point, however, a sufficient change in the level of intimacy of the interaction will be noticed, and consequently some behavioural adjustment will be necessary.

The precise adjustment that will be made however, depends on the way one labels the state of arousal. The situation can be label either positive or negative, depending on the circumstance.

The Arousal model of intimacy incorporates the equilibrium principles proposed by Argyle et al (1965) but adds another dimension. This model permits us to predict that a change in the behaviour of one person may lead to a variety of reactions in the other person depending on situation factors.

The final section of the handout covers the two models which apply the theories of communication in a psychological context. The prose needed to describe these is cut down to a minimum in comparison to the holistic handout. The layout of the material also emphasises the elements which make up the theories rather than the concepts of the theories, producing an overall emphasis on analysis of the subject, which reflects the analytical approach.

Summary of handout presentation.

The above section outlines how the handouts were presented so as to emphasise holistic or analytical presentation. At points there is strong convergence between the

style of the handouts such as with the presentation of structure of language. At this points it should be recognised that the handouts only make up part of the lecture presentation, that is the format of the handout can be enhanced or expanded upon by the lecturer. This was occasionally necessary in order to develop a useful and manageable handout. The language structure was made appropriate for each presentation style by changing the examples the lecture uses, as is noted above. The visual aids and over head projections (ohp's) also serve to create a distinctive presentation style.

In short the main differences between the handouts is that the holistic handouts links the subject matter directly in with broader issues and real world examples. Which emphasises the operational and practical issues for the topic presented. While at the same time trying to keep a sense of the whole rather than just cutting the topic down into the immediately relevant points. The analytical presentation of the handouts established a focus on the primary elements which make up the topic area, the theoretical and academic issues that constitute the subject. The points of convergence and similarity between the handouts is a product of practical constraints which demand that set information must be included within a topic. Considering that effective teaching was always a central tenant within this study then points of convergence are to be expected. Some material by its very nature is more holistic or analytical, for example describing the elements of language is quite an analytical task. This does not mean however, that the required overall emphasis cannot be developed in spite of material which may not fit neatly within this emphasis. As has been shown in the descriptions of the handouts above, more analytical information can be made more holistic by adding appropriate examples and support information. It is this overall emphasis of the lecture that is seen as important and a lecture can still be presented in a holistic style even if it does contain a degree of analytical information and vice versa.

Use Of OHP's within the lectures.

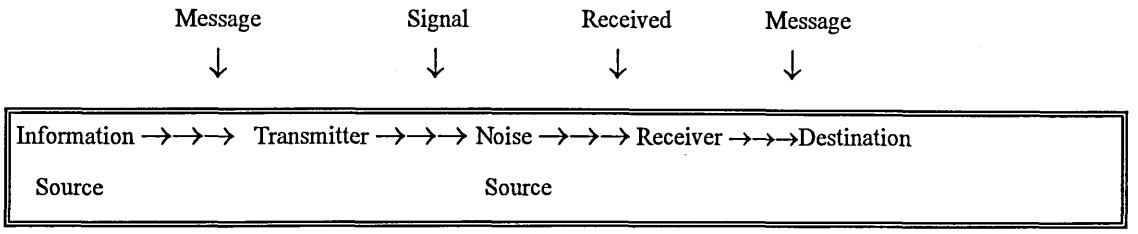
As the students noted that they perceive visual aids and especially ohp's as central to an effective lecture then they had to play a central role within all of the experimental lectures. Within the lectures ohp's were actually used for support, that is they were not used to introduce new information but rather backed up what was presented by the lecturer or the handout. For this reason they frequently followed the same structure as the handouts, presenting information in the same order to avoid confusing the students as to what issues were being presented. Part of the time it could be argued that the ohp's took on no more of a role than simply a guide for the lecture. This may or may not be effective use of ohp's but as the use of the ohp's remains constant between the lectures and it was only the presentation format that dramatically differed this was taken as not being possible confounding variable for the study.

In order to illustrate the exact format of the ohp's and how the analytical ohp's differed from the holistic ohp's the ones used in the 'Communication and Language' lectures are presented below. The actual format in which the 'overheads' were presented is not used here as this would disturb the follow of the text to much, the type set being overly large for example. The content however, is replicated exactly and where layout or type face is important to creating a holistic or analytical effect to the presentation then the reader is directed to the relevant appendices where exact copies of the original ohp's can be found.
N.B. Justifications and comments about the creation of relevant presentation styles can be found in the single lined boxes.

Analytical OHP's for Communication and Language lecture.

Lecture Title Acetate - While the students are arriving and the lecturer is organising lecture notes, the tile of the lecture is shown. This is presented in no particular style, just informs the students group of the lecture topic. In this case the title ohp simple read, "Communication and language - by Iain Garner."

Shannon and Weaver's Model



The problem of feedback.

1. A one way street or a dynamic process? The effect of the receivers NVC on the sender.

2. Communication in Context. The expectation Affect or The Communication game - We do not respond the same in all contexts, can be altered by who we are talking to, when we are talking and where we are talking.

3. The Common Ground Concept - we need to know about the other person in order to communicate easily - this is where implicit personality theory comes in.

The analytical approach to the lecture was instigated by presenting the Shannon and Weaver model at the start of the lecture. This instantly divides the communication process into discrete units and to a certain extent de-problematisies the process. The analytical style of the lecture is thus reinforced by the academic model, which presents communication's base elements only, each of which is related too but separate from the others. (It was recognised within the lecture that Shannon and Weaver's model of communication has been updated and flaws within it have been addressed since it conception. These flaws within the model were used to develop the theme of the lecture as will be seen in the points below.)

Although the model did create a strong analytical feel it was necessary to present the notion that communication occurs in a real world and this often complicates neat and

tidy models. The points which were added were the dynamic process of language and the need for the recognition of 'feedback' in the model. Communicating in context and the effect context has on our interaction, and finally the importance of common ground when communicating. In order to keep the emphasis of the ohp analytical, these issues were made as simple numbered points and were explained from a theoretical position. For example, communicating in context was given its other possible names, (the expectation effect and the communication game.) it was then explain directly, that it was the effect of the who, when and where of the communication on what is said. Although this expansion of the original model to one which represents more 'real' communication, which in turn shifts the emphasis of the presentation more toward an holistic style, the analytical emphasis is kept by keeping the explanations in a theoretical framework rather than giving common everyday examples.

The Language we use in everyday life follows a structured format and a rigid set of rules of combination and usage.

1. PHONEMES - The elemental sounds of any language.

2. MORPHEMES - The smallest meaningful units of language, that is words.

3. GRAMMAR - The way in which morphemes can be created or combined into sentences.

    3.1 Morphological Rules - Rules for the construction of words.
    3.2 Syntactical Rules - A set of rules for the construction of sentences.

Understanding language.

The UTTERANCE - The single word statement.

The LOCUTION - A sentence with particular meaning.

At this stage strict rules break down and wide ranging semantics take over.

The above layout is designed to emphasise the hierarchy that exists within the structure and usage of language. The numbering moves from the simple to the more complex as it increases in size. Each element of the structure of language is explain directly in academic terms, rather than each be implicitly explained by the use of an appropriate example. To avoid mis-informing the students it is noted at the end of the section that by the time language and communication reaches a semantic level the strict rules and hierarchical structure break down.

According to Searle 1979, we can convey five basic types of meaning.

1. Representatives - The speaker is committed in varying degrees, to the truth of the proposition.

    e.g. Affirm, believe, conclude, deny, report &c.

2. Directives - The speaker tries to get the listener to do something.

    e.g. Ask, challenge, command, insist, request &c.

3. Commissives - The speaker is committed in varying degrees to a course of action.

    e.g. Guarantee, pledge, promise, swear, vow &c.

4. Expressives - The speaker expresses an attitude about a state of affairs.

    e.g. Congratulate, thank, welcome &c.

5. Declarations - The speaker alters the external status or conditions of an object or situation solely by making the utterance.

e.g. You're fired, I resign &c

It is the listeners job to decide which of the above motivated the speaker.

Within this section it was desired to re-establish a structured and analytical format about the semantics of language. Something that already had been acknowledge as being diverse and not open to the same simple structure as linguistics. The work of Searle 1979, allowed a justification of placing limits on what was presented and being able to submit the five clear types. Yet it was important to note that the areas were not finite. This was done by presenting a few examples followed by (&c) etceteras, implying that although the categories were limited, the possibilities within each of the areas was unlimited.

PARALANGUAGE - These modify language, they convey little or no meaning on their own but combined with language add extra meaning.

e.g. Pitch, rhythm, intensity and pauses.

LIES AND PARALANGUAGE - Watch how you say something as closely as what you say.

Combining our communication.

Equilibrium - Keeping a balance with our interpersonal relationship while communicating. We balance out any 'unevenness' in one channel by compensating with another.

PROBLEM - What if we want to change the equilibrium ?

Arousal Model (Patterson, 1976) - A change in behaviour of one person can lead to a variety of reactions in the other person depending on situational factors.

The introduction of paralanguage broadens the presentation of language yet further. The analytical emphasis is kept by keeping the examples given as purely to the classification of paralanguage rather than trying to show them in action by putting them in a sentence. To show that paralanguage is not a purely theoretical concept and does act directly on our communication the example of lies and paralanguage was given and the ways in which liars can given themselves away was discussed.
It was felt at the end of the lecture that the information needed to be draw together, that is, the verbal and the non verbal elements of language. The equilibrium and arousal models demonstrated this to good effect. The analytical style was facilitated here by using very direct points, such as the highlighted 'PROBLEM' which divided the two theories. This clearly put forward that there were limits to the equilibrium theory. Physically it acted as a division between the two theories allowing a clear point by point layout to be achieved which reinforced the analytical presentation style.

Overall the ohps were made analytical by focusing on keeping the information as brief and direct as possible and creating a layout which emphasised this clear cut format. The layout was achieved by putting physical spaces between the points in an effort to separate each point theoretically as well as physically.

Holistic OHP's for Communication and Language lecture.

The title ohp used at the beginning of the lecture as the students arrived was exactly the same as the analytical presentations. That is, it contain the lecture title, "Language and communication", and the lecturers name "Iain Garner." The holistic presentation ohp proper is presented below.

Language.

This royal throne of kings, this scepter'd isle,
This earth of majesty, this seat of Mars,
This other Eden, demi-paradise;
This Fortress, built by nature herself,
Against infection, and the hand of war;
This happy breed of men, this little world;
This precious stone set in the silver sea,
Which serves it in the office of a wall,
Or as a moat defensive to a house,
Against the envy of less happier lands;
This blessed plot, this earth, this realm, this England...

As it was the desire with the first analytical ohp to create an instant analytical feel with the model of communication, it was also the desire here to create an holistic feel. This was done with the extract from Shakespeare. This made the first contact with the lecture topic actual language rather than an academic theory or model. It also severed to introduce the example which would be used throughout the lecture, that is the extract would be referred back to when each new point was made about language. This allowed a feeling of unity to be established between the points that were being made and hence supported an holistic emphasis.

Why are there so many interpretations?

Noise.

↘ **Contextualisation.**

↘ **Common Ground.**

Elements of a Language. (Syntax).

Grammar

Morphemes

Phonemes

After demonstrating that even a short passage, such as the one presented, can have many interpretations, then the reasons why were presented. The same ideas as in the analytical ohps were presented, that is, noise, contextualisation and common ground. To reduce the notion these are completely separate points linking arrows were place between the points. The lecturer also drew an arrow linking common ground and noise, plus added two headed arrows as the points were expanded. (The reason the large arrow and arrow heads were added dynamically as part of the lecture, was partly due to technical difficulties in getting the word-processing package to the desired additions and partly to develop a train of thought within the lecture.) Overall the establishment of the linking arrows demonstrated that the each of the concepts feed of the other and effected the other, for example the lack of common ground can be one source of noise.

As was noted when discussing the presentation of the lecture handouts the structure of language is quite analytical in it format, with its recognised rules and constant elements. For this reason the presentation of the elements of language was analytical, although a more dynamic presentation may be more holistic this may well have cause difficulties for the students and made the information more difficult to understand. Although what was presented on the lecture ohp is very analytical it should be noted that the lecture actively added real world example to demonstrate that what was being

presented were academic labels to features of language they already used. This would act to temper the analytical nature of this section with reference to real world usage.

Communicate the meaning.

Linguistics Vs Semantics ?

The Utterance. The single word statement. 'No.'

The Locution. A phrase with a particular meaning. 'I don't know, do you?'

5 Types of meaning - Searle 1979.

1. Representatives.

2. Directives.

3. Commissives.

4. Expressives.

5. Declarations.

Due to the nature of ohp, there is a limited amount of information that can be place upon them. Firstly due to physical size and secondly due to the fact students have to be able to quickly read them. Both these factors have the effect of making it difficult to present in an holistic format, mainly because an holistic emphasis tends not to fit well into the clear cut points that the ohp tends to favour. The above ohp has been used to present the issues which the lecturer will focus on and expand. Examples of where linguistics and semantics merged was given using the Shakespearean quote from the beginning. The ohp itself is not an holistic format but when combined with the lecturers presentation and the handout, the overall emphasis of the lecture is holistic.

Adding to language.

Para language. - The Oh, the Errs and the silent pauses.

Putting it all together - Communicating in context.

Equilibrium Model Argyle and Dean - 1965.

Arousal Model - Patterson 1976.

The examples of paralanguage used here are focused on the actual act, what paralanguage is. This is used as a starting point for the lecturer to demonstrate how a sentence can be changed by the emphasis which is placed on certain words within the sentence. (This was done using the Shakespeare extract from the start of the lecture.) This is not to say that the appropriate labels weren't given as in the analytical ohp but rather the primary concern was real examples of paralanguage. As with the previous ohp the studies were presented purely by their titles, this was done so the lecture could place the in an holistic context by the use of real world example. Example which would have been to cumbersome to present on an ohp in an holistic format. If they had been reduced to a bare minimum then they would look more like analytical bullet points then the intended holistic form.

In Conclusion.

From the above presentation it can be seen that the analytical ohp fit more easily with the ohp format than the holistically presented information. Where possible an holistic feel is presented within the ohps themselves, often this is done by linking the points together to emphasising that there are not clear cut distinctions between topics and these divisions exist in the theory more readily than they do in the practice. However, at time it was not possible to create an holistic style within the tight frame work of an

ohp. At these points simple title are placed on the ohp to mark what point the lecture discussion had reached. The metaphoric 'holistic baton' at these points is picked up by the lecturer who is able to presented the complicated example or actually demonstrate a point, something which may well be impossible or inappropriate within the ohp format. The Analytical ohps tend to tessellate with the ohp format far better than the holistic overheads. This mainly due to the fact that ohp tend to present best the clear points, the summaries and overviews. Things which are the ideal of an analytical presentation.

The Lecturing.

The final part of the triumvirate of manipulated elements of the lecture was the lecturing itself. The aim of the lecturing was to consolidate the style of the lecture while ensuring the information was put across to the students effectively. The gross level distinctions between the analytical and holistic style lectures were clear cut academic examples and discussions of points for analytical lectures and broader ranging, everyday contextualisation during holistic lectures. The aim was to keep the amount of discussion of points equal between the two lecture styles so that, analytical lectures did not become synonymous with short sharp lectures and holistic lectures associated with a rambling style. Such possibilities were reigned in by the handouts and ohp's which severed to guide the lecture, which kept it on target.

Another cautionary note was that the two lecture styles should not have an associated, perhaps stereotypical 'personality of lecturer' associated with them. These stereotypical images can be drawn from what has been presented so far about each style. The analytical style with its emphasis on theory and academic examples could be construed as being more serious and 'dry', lacking in humour and variety. The holistic lecture perceived as simplified and frivolous, focusing more on everyday interpretation rather than a truly academic one. It was desired that such stereotypical images should be actively avoided during the study. The best way to do this was to carefully plan each lecture in advance so that it met the requirements of the style but did not caricature it. The focus of this planning was done on where to expand points and what examples to give, other more basic planning was present in the structure of the handouts and the overheads themselves. In the appendix there are the annotated lecture handouts for the holistic and analytical lectures discussed above. These were used as lecture notes and guides. On them it can be seen where examples were to be added and what these examples were, also marked on them is how the presented material was going to be exploited to aid both student comprehension and facilitation of a particular style.

The stereotypical images also were guarded against by some of the base features of lectures cited by students. The first related feature was the desire on the students part that there should be some humour within the lecture, which could be used to lighten the atmosphere especially after difficult issues had been presented. This made sure that a 'dry' analytical presentation was not appropriate. The second point was that the lecturer should be approachable, this would not be the case if the lectures was presented in an aloof purely academic or theoretical style. These were yet more reason which meant the lectures had to be carefully planned in advance.

Phase One Data.

The information presented in this appendix was collected to aid the design of the structure of the focus groups and gain a insight into what students perceived as the important issues concerning lectures were.

Questionnaire Used.

WHAT MAKES A GOOD LECTURE?

This unstructured questionnaire is investigating what different people consider to be a good lecture. In order to fill it in, think of a lecture which you considered to be a good lecture. What features made it good, what made it standout? Please list what you believe are the TEN most important features of that good lecture. Please note it is important that you list what you considered to be important no matter how mundane or extraordinary the points appear to be, as I am seeking a personal insight into lectures.

In anticipation of your co-operation very many thanks for filling out the questionnaire.

Iain.

(*On the reverse of the questionnaire was the same question but asking for the negative features which inhibited learning. No numbers of points or request for specific types of information presented so that the students were able to comment on whatever they felt was appropriate and were not constrained or channelled by any external factors.*)

Results of the Data Gathering.

ENVIRONMENTAL FACTORS - BAD

Uncomfortable chairs
Other students talking.
Room too hot or too cold
Poorly lit room
uncomfortable chairs
Badly equipped rooms
uncomfortable chairs
Size of lecture group inhibit student contribution to the lecture
Boring
too hot - sends you to sleep
Too large classes
Room 309 is always too hot and stuffy causing drowsiness
Room 309, too hot
Very hot rooms
Not getting the room set up as the lecturer wants it.
Not being able to hear properly
Too hot
Poor air conditioning in a room (too hot to concentrate.)
Poor air conditioning (Lack of fresh air).
Being in an unsuitable room (i.e. no lecture theatre.)
Boring
Room too hot or too cold
Good temperature to work at.
Cold rooms
Rooms that are too hot or too cold
A hot or cold room
An uninteresting , hot, stuffy room.
A room with small desks (or strips of wood)
Temperature of the lecture room at the optimum
Noise and lack of interest from other students
Too cold / hot room

ENVIRONMENTAL FACTORS - GOOD

Small Room
Warm Room
Few Students
Gap before/after next/previous lecture
Hearing the lecture properly
9.15am start for the first lecture.
Few disruptions
No smell from wards brewery
More desk space
Lighting
No distractions (noise Talking)
Room not too warm or too cold
Properly equipped rooms and labs
10 am and onwards starts
I didn't feel ill, tried or have a hangover
I'd had lunch
The lecture wasn't interrupted after 20 or so minutes by a group of people deciding:-
To hold a conversation
Turn up
Asking irrelevant questions
A late start - time for caffeine to take effect
Not too early in the morning
Lectures held at sensible times of the day e.g. not 4-5 on a Friday
Comfortable temperature
A later start from 10am onwards
9am good start
Lectures in the morning
Smaller groups
Atmosphere
Not too late in the day.
The lecture is not too early or late in the day
A down - to - earth atmosphere
Not too early
smaller groups
finishing early
Smaller groups
in the afternoon
interesting topic area
finish on time
interesting subject
informal atmosphere
having a break before and after the lecture
shorter i.e. less than an hour
V late start (after 12.00)
comfy chairs
well aired room , but not constantly air conditioned
tutorials relevant to lectures
afternoon lectures
having a break between hours
interesting subjects
warm room
morning lectures not afternoon

Relaxed atmosphere
Not too early not too late in the day
comfortable warm room
Interesting applicable topic

GENERAL FACTORS - BAD

Monday Mornings Friday afternoons
Uninteresting subject.
Lectures before 12.00pm
Lectures on Thursday Mornings
Lectures on Friday afternoons
Lectures on a Monday and tutorials a few days after when everything has been forgotten
Lectures can be too formal.
Lecture is irrelevant to course.
A boring lecture, which puts you to sleep.
before 11.00am lectures
Boring lectures
Boring topics
Morning lectures
Being taught opposing lectures in different lectures in the first year a list of lectures would have been useful to decide if mature students need to turn up for certain lectures.
9.00am lectures
Boring presentation of subject matter.
9.00am lectures
Lectures in the late afternoon / dinner time.
Lecture where you have to copy notes off the board and while you are doing this the lecture is explaining the theory.
bad timing - too early in the day to concentrate on lecture
Early lectures
doing the same activities every week such as case studies
Being spoken to like a child / idiot.
9am starts to early with a low attention span by students.
Sometimes too many lectures on one day, so concentration / enthusiasm drops
3pm too late to concentrate
Boring topics with no relevance
Doing basic topics which I have done already (which is difficult to avoid sometimes).
Intense (?)
Boring
Intense
Any lecturer before 11.00am
Not interesting
Subject to vague (i.e. why are we doing this? What relevance does it have.)
Covering the same information two weeks running.
First thing in the morning
Subject matter vague
Relevance to course be brought into question
Formal - treated as a lesser not an equal
9.00am starts
no group work
4.00 pm starts
9.00 am starts
Friday lectures
Evening lectures
Videos
9.00am become hard to get to due to laziness
Any type of group work is annoying
9.00am lectures
going off at tangents to the original criteria even though sometimes it might be useful

Boring
topic of course relevance to the degree
9.00am is too early
Apathy of other students
Aims and objectives of students - interest / disinterest.
Too early in the morning
Non - interesting subject area
Not knowing why the lecturer is a lecturer (no idea of the lecturers credentials - who is he ?)

GENERAL FACTORS - GOOD

There is no such thing as a good lecture.
Interesting topic
Bit more communication with students in lectures
feedback
laid back atmosphere
Subject interesting
The knowledge and required knowledge of the students are taken into account
Tutorials on the same day as lectures
Student participation
Relaxed atmosphere
Lecture relevant to current work
I understood something that had previously eluded me, EUREKA!
The subject matter was interesting
I'd got some overdraft left.
A student has to be able to see the relevance of the context of a lecture
It is directly related to a students own personal interests
Interesting or made to be interesting
Interesting
Good lectures are usually well attended
Doesn't expect everybody to be superstars
interesting work
interesting topic
Interesting
make the subject interesting

LECTURER FACTORS - BAD.

Lecturer does not pay attention to the speed of the students.
Too few examples to illustrate from.
Too much information to take in.
Lecturer to quiet.
Lecturer cannot speak good English.
Lecturer teaching incorrect facts - needs correcting by students.
Lecturer not speaking clearly or in English.
Constant talking for long periods.
Bad eye contact.
Lecturer pacing up and down
Unclear voice
tone of voice
Constant talking for long periods of time.
The lecturers voice is not very interesting
Information is expressed in a boring manner
Tutors monotone voice.
Boring unexciting, uninteresting lectures
Lecturer referring to books and notes all the time.
No humour
Talking to the board or overhead
boring tone of voice
Boring Mono-tone lecturers
No jokes or Humour
Lecturers who disappear and are not seen until the next lecture
not talking to the students
Lecturers repeating exactly the previous weeks notes for too long and not giving enough time for new data.
The lecturer has a monotonous tone of voice.
The lecturer obviously finds the subject boring as well and doesn't try to liven things up.
The lecturer lacks a sense of humour.
Failure by the lecturer to recognise the lack of understanding of the student - despite being made aware, dissuasive of the problem.
A poor lecturer in my opinion is one where the lecturer goes too fast and you cannot write any notes down.
The lecturer cannot get through to students.
Lecturer has a strong accent
Lecturer goes too fast.
Doesn't ask the students if they have understood the work
Lack of working examples.
Lecturers who are not confident.
Talking too much without stopping for pauses.
Same tone of voice.
bad eye contact
lecturer walking up and down.
Bad preparation.
Lecturer mumbles
Irrelevant material.
A lecture that seems to give a lecture on auto pilot
Bad presentation and explanations of a complex subject
Poor class control by lecture
lecturers that cannot be heard and understood
Mono tone voice of lecturers

Robotic lecturers
Monotonous, droning, near political style / tone of voice.
Having handout from lecturers who do not use a grammar checker (or spell checker) who have a limited command of the English language.
Lectures who lose the plot
The assumption that the lecturer make that I understand, what is to him a simple theory.
Strong accent of the lecturer
Their inability to project their voice which is essential as some students natter a lot in the lecture.
Uninteresting voice
Droning on and confusing everyone.
Monotonous voice
Laughing at own jokes that aren't funny.
Taking when it is not quiet.
Not being able to understand the lecturers accent
just handouts which are read by the lecturer are boring
When the lecturer can't get the point across and confuses the subject more.
Monotonous lecturers who ramble on without pauses.
Lectures without clear voices
people who go to fast to make clear notes
people who cannot transmit enthusiasm for their subject
lecturers who let people talk in lectures and disturb other people
Being unable to understand the lecturer i.e. strange accent
The lecture being presented in a boring mono-tone manner
Lecturers not addressing audience
monotone voice
not getting the point across
lecturers not knowing what they are talking about
rambling
Not showing interest in what they are talking about
Talking too quietly
Monotonous tone of delivery by lecturer sends you to sleep
When lecturers stick to the handouts and don't elaborate on key areas
Unnecessarily repeating the same concept when students have grasped it.
Subject too difficult - no elaboration / breakdown.
Explaining a difficult concept once , then advising everyone to look up further in a library.
A ramming lecture without back up.
Amusing moments are rear.
Having a lecturer talking on and on from start to finish continuously
A tone of voice which sends you to sleep
Dreary voice
constant verbal communication
Uninteresting
Non - entertaining
Not well structured
Too advanced - assuming we know more than we do.
No entertainment value
A lecturer who cannot speak English
Poor presentation of material by lecturer with inadequate follow up notes
Lecturer too theoretical
Bad use of the English language
Trying to explain something when people are trying to write from the board
Going on about a subject and then saying you don't need this
Asking if there are any questions and then pulling down people when they ask questions
Lecturer unable to give information in an understandable format

Lecturer has poor command of English
When asked to clarify points - lecturer unable to get the message across
Lecturers aggressive attitude discourages students from asking questions for further clarification.
Not able to speak good English
Impatient
Not giving encouragement / support to the students
Gets frustrated if asked to repeat a section of work
Repetition of work
Doesn't explain ideas clearly
Same boring tone of voice
No change or excitement to help us concentrate
Unclear presentations
Whilst copying from the board or OHP the lecturer is talking and explaining the theory.
Lecturer not speaking clearly
Lecturer standing in front of the overhead
Whilst copying from the board / OHP lecturer discusses another matter.
Going over things we have done the week before
OHP's betaken away too quickly
Lecture having no relevance to tutorial
Information not available to backup lecture
Explaining a subject over and over again when it is not needed by the majority of the group.
Lecturer constantly talking
Lecturers who don't listen.
Lecturers talks all the time, which is boring.
Technology relevance is often not given . We just start doing things without them being explained
Not making the lecture interesting
Poor organisation.
A lecturer who spends half the time fiddling with the lights and papers etc.
Lack of interest in the voice when speaking
Not really sure of the subject area
Hardly any lecturer audience rapport
Treating the audience like they are children.
Not concerned or interested in what they are teaching
Simply learning a set of information and repeating it in a lecture theatre, i.e. no spontaneous input
To formal - i.e. treated like school children
Hard to understand the lecturers accent
Monotonous tone to lecturers voice
Personal demeanour
Presentation of the lecture
poor communication from the lecturer
Non - understandable lecturer
Lecturer spends to long on a single subject

LECTURER FACTORS - GOOD

Keeping the interest of the students not boring
Lecturer relates to tutorial work.
Lecturer on time
Lecturer good speaker.
Two lecturers taking the lectures.
Good organisation of lectures in introduction so that the topics to be covered are known to all.
Question and answer slots
Gives good lecture notes.
Clear voice, easy to understand
good eye contact
To the point and interesting
Lecturer should be light hearted
lecturer should speak clearly
should have discussion sessions.
Humour to keep your interest
clearly spoken and slowly spoken
Don't stay on one topic endlessly
to be light hearted
Lecturers to tell people to leave or shut up, who are continually talking
To try and keep the material in lecture closely relevant to assignments
Lecturer to have a good command of the English language.
Humour
Not so serious
A joke hear and there
Lectures should avoid waffling, they should make a point, put it across and expand on it, give examples and avoid drifting from the subject
Lecturers should keep control of the lectures and dismiss disruptive people who continually talk throughout the lecture.
Context of the lectures should be relevant to the assignments, should also limit the supply of unuseful, inappropriate information and should also highlight information that is specifically relevant to the assignment.
All lecturers should speak clearly, e.g. good English
Making lectures interesting and fun
Tell students in advance as what to expect from the nest lecture
lecturer not going off on a tangent when talking about something
Relevance to previous work
Humour, even some attempt would be a plus!
Audience lecture communication, not just lecturers blabbing away.
sympathetic to students needs
Clearly spoken and confident
Doesn't mind students nodding off during lecture
lecturer is entertaining as well as informative
variety of examples given
Can communicate well with students.
Good working examples
Good communication skills
Happy
Humour
Good eye contact
Interested in subject
Material communicated well and easily understood
Lecturer speaks clearly

Lecturer makes a boring or difficult topic interesting
difficult material clearly explained
Lecturer makes reference to how the material relates to assignments.
Material related to other situations
Good oral presentation of material
The lecturer starts and finishes on time
Good control of disruption caused by certain members of the class
Where possible subject are explained and relevant examples are given to help understand the subject material
Humour
Try and make it interesting, relate the text to other things that can easily be remembered
Humour
The lecturer didn't seem to be playing the game of "Explaining something in computer terms" and see who knows what the fuck I'm on about.
Simple notes in point form that were expanded on and therefore I could take legible notes at a steady pace
The lecturer was witty.(Maybe he didn't realise).
Clear voice, clearly audible any where in the lecture room
clear explanation of the subject matter
includes students
doesn't cancel lectures
funny
Not boring
Lectures which are a bit different and have a bit of fun to it
Approaching the subject from a different way instead of going through handouts and copying notes
Not monotone lectures
lecturers who control the lectures
clear speaker and simple language
assume extensive background knowledge
plenty of clear relevant examples
Addressing Audience
Showing interest in subject
eye contact
hand movements
Loud voice
Interesting ?varied delivery of lecture by the lecturer
When lecturer relates the relevance of the material to students with relation to the course / their life.
Light-hearted / easy going
Humour
Enthusiasm on lecturers behalf
Humour
Real life comparisons to subject
Relevance to degree / useful outside subject
Charismatic lecturer
Lots of examples to explain difficult concepts
Jokes
Younger lecturers
Cracks a few jokes
Well structured lectures that are appropriate to subject
lecturers don't go off at a tangent
Making lectures interesting and informative
Lecturer has a sense of humour
lecturers talks to you and not at you
A lecturer has to have a perspective in terms of students future

Not being too serious, giving Anecdotes from time to time
Change in Voice pitch
Taking Quickly
Entertaining
Summarising points
recapping important points
real life examples
tone of voice
Non - verbal communication skills
Wording of lecture - appropriate tone of voice
Entertainment
Good looking lecturer
good examples
Summaries at the end
good non - verbal skills
entertaining
good examples
not too intensive
interesting
relevant
Entertaining
Periodic summing up
relevant
Good use of English language
Important and useful information
Good explanations of subject
well balanced teaching
Produces good notes
Lecturer helpful
lecturer understanding of students viewpoint and willing to listen
Ability of lecturer to speak clearly
Lively personalities
give encouragement and support
Will listen and give clear advice
Approachable
presenting clear goals in assignments
Clear presentation
put forward in such a way to make topic interesting
allows feedback
approachable
allows everyone to understand without going over to many times making it boring
changes pace to liven things up.
keeps audience under control
questions the audience
well written and thought out lecture
lecturer or tutor being on the same level as you (i.e. not looking down on you.)
lecturer being on the same level
lecture thought out beforehand by lecturer (not making it up as they go along.)
Explaining the subject in a clear, non technical way
non patronising
jokes
jokes
Keeping peoples attention
different forms of communication for the information

a lecture that flows through. Not starting and stopping
Lively lecture with jokes
Amusing comments at certain intervals
not patronising
Encouraging students interaction (practical tasks during lecture)
lecturer is interactive with the student (doesn't just talk at you)
lecturer is understandable
understandable lecture
humour
lecturer knows his potatoes (doesn't waffle or talk at.)
Interaction between lecturer and students
Don't just talk and talk and talk
don't talk while people are coping the OHP
Good use of English, speak clearly
Don't just talk and talk and talk
don't talk while people are coping the OHP
Good use of English, speak clearly

TECHNICAL FACTORS - BAD.

OHP's too small to read.
Too many students in a lecture
Poor photocopies for handouts
Not enough handouts
Room too large / can't hear properly
Too long a gap between lectures, therefore lose interest.
Illegible writing on board / projector
no pillows provided
lecture is not inn English
No handouts
Too many handouts
too early
Gaps of three hours between lectures
Lectures cancelled and not told about it.
Lectures too early in the morning (Then space of a few hours until the next one).
The lecturers sometimes can't be heard because of other disruptions.
Too much writing and taking notes.
Too much constant talking by the lecturer
Too much note talking.
Handout after handout.
Unreadable OHP's
No student lecturer interaction
Not enough OHP's
No handouts
No visuals
Extensive note taking
Tutors putting OHP's up and not giving the students long enough to copy them before they take them down.
Unreadable OHP's.
Lecturers may not give enough time to take notes from OHP before moving on to another subject.
Handouts are usually sparse and not enough of them.
Unclear notes / OHP's
No handouts
OHP's Unclear
Reflection of OHP's light on the white board.
Lectures and tutorials don't relate.
No handouts, and the lecture is given that fast it is not possible to adequate take notes.
Not enough handouts for a lecture can mean that students without handouts might as well of not turned up as the lecture is based around the handout.
Complex diagrams that are shown on OHP and not on handout
OHP's that are illegible and poorly presented.
Poor use of OHP's and handouts
Piles and piles of unreadable handouts, that seemingly bear no resemblance to the subject and therefore will never be read.
Overly complex OHP's that are too difficult to copy.
Legibility of OHP's
Too many notes to make - especially when you don't have time to finish them.
Rushing through the material
no Visuals
No handouts
Back to back lectures can lead to inattention.
too much material without appropriate note / handouts

Having to take notes quickly while the lecturer is talking
Illegible / small writing on the board
Sometimes not enough time is given for note making
Taking notes too quickly
Loads of full OHP's to copy out.
Poor use of OHP's that are unclear and difficult to read
Poorly explained handouts.
Cramming information
Complex diagrams
Rushed lecture
Poor visual aids
bad structure
Bad communication
too many handouts
complex diagrams
Poor structure
No handouts
No summaries
No visual aids
Irrelevant information
No handouts or visual aids
no summaries
Not enough interaction with the class
Bad use of handouts, giving too much information and not in clear English
Incoherent notes
badly taught subject
Subjects not covered properly
Time scale of subject not taught properly
Relevance to actual subject ? real world
Not able to write clearly on the board.
Poor handwriting
No pictures to explain theory
Moves too fast
moves too slow
No feed back
OHP's being taken away too quickly
Tutorial straight after a lecture. (I need to be able to go over the material covered in a lecture before going into a tutorial
Not speaking loud enough.
Not being able to see the OHP's from the back of the room.
To many written notes
Poor OHP's
Writing too much
Afternoon lectures
Friday lectures
Too many notes
too long
Too technical
OHP's
Poor writing
Too many notes
Incomprehensible lectures
A lecture with no back up material and visual aids (too boring).
One hour lecture with gap either side have a tendency not to go.

A lecture which has the same tutor as tutorials, if you don't understand them you have no one else to ask
No visual aids
Not enough visual aids to keep the audience interested
No happy medium between writing to much and the handouts covering everything
Too many notes
Information not available to back up lecture
Closely typed handouts
No idea of what the subject area means to you.
External distractions
No interactions

TECHNICAL FACTORS - GOOD

OHP's focused and Clearly set out.
Examples in Handouts
Handouts
Enough time to take down all the info from the OHP's
Visual aids
Good use of OHP's / Notes
Doesn't last too long.
Not too many OHP's
use of various visual aids
Well prepared handouts
well prepared OHP's
Steady pace
No need for continuous note taking.
Not too much note taking so there is a chance to listen
In the afternoon
Not on Thursday Morning
Lots of handouts and OHP's, so full attention can be given to lecture
Good use of OHP's
Well written and easily understandable handouts
OHP is clearly written
Plenty of time available to take notes
handouts concise and self explanatory
You are given handouts of notes required.
Good handouts
Use of board or OHP
Clear and understandable OHP's
Plenty of Handouts
Notes remain on OHP long enough to be copied down.
Well presented and structured OHP's
Detailed information put on handouts
Complex diagrams being shown on handouts
Time allocation for questions from the lecture group
Handouts, instead of taking notes
Visual aids - colourful and different to what is said by lecturer
Good lectures are structured where we have handouts, take notes and use OHP's
Notes given in a handout - can listen to lecture in full rather than trying to scribble down as much as is humanly possible
Clear OHP's
Different layout from ordinary boring lectures
Not talking for an hour
Visuals
Handouts
Time table with thought
Good handouts / notes
Asking for feedback
practical activities
Clear structure / Slides
Clear OHP slides - not too complex
Working from handouts
Handouts so you don't spend the whole time writing and not hearing the lecture
lectures close to tutorials
Gradual progression after monitoring student progress

Knowledge that in technical areas most students haven't got a clue
A few extra but short OHP's (with some handouts).
Good use of OHP's that are clear and easy to read
handouts that are clear and well defined
Use of videos to explain the subject matter
Well place OHP's
Good structure well planned
Clearly written OHP's (Preferably computer generated)
Having breaks between long stretches of the same topic and a different topic
Good use of visual aids
handouts
Well structured
Good structure
good visual aids, but not too much information all cluttered together at once
handouts
visual aids (OHP's)
Summaries
Good handouts, visual aids
well structured
Handouts (briefly going over lecture)
Good use of Overhead and blackboard
Good structure - well though out lecture - delivered well by lecturer
study notes provided
use of OHP's
Diagrams say more than words
good / clear handouts
lecture well structured to lead from one topic to another
lots of graphics / pictures
handouts
Handouts
lecture being on the same day as the tutorial
relevance to the course
use handouts
group work
useful OHP's
relevant to the type of job sought when leaving University
relevant to tutorials
lot's of handouts
group work
practical work
good lectures
questions and answers
questionnaires
relevance to the course
short
no long talking bits
no assessments
lots of handouts
group work
lot's of OHP's and handouts
relevance to course
fairly easy
Good handouts.
well organised with handouts

some audience participation
Handouts
use of OHP's
Useful handouts
relevant to jobs that might be sought
OHP's - no writing on white boards
a good lecture finishes early
good lecture notes
OHP's supporting notes
handouts that are comprehensive
suggested references to good text books
Interesting lecture technique OHP's diagrams etc.
clear goals (understanding why I am here.)
If there are OHP's give time for them to be copied

Appendix Showing: Data generated by the focus groups.

The data presented in this appendix was used to aid the design and attunement of the experimental lectures. This information was also the basis for the students awareness issues concerning the approach to learning in lectures.

Order Information from All Student focus groups:

Concerning Handouts.

Handouts explained during lecture contains the bare bones.
intergrated and space to add extra info.
Handouts co-inside with the lecture.
Handouts given at the end of lecture to reinforce information given
Handouts that allow you to make notes and make them yours, not photocopies of the some text book - they're not read.
Handouts with the IMPORTANT notes from the lecture.
Handouts need the important points, but enough room to personalise them.
Handouts with space to write on, given out at start of lecture.
Handouts that are relevant to the course.
Fill in with own information.
Handouts of lecture given at the beginning of the lecture.
Clear information.
Overall basics of the lecture but allow space for own notes and references.
Detailed handout
References in the handout
Comprehensive but not highly detailed handouts.
Detailed handout
That are clear and easy to follow
Which is explained to you during the lecture
Which basically explain the contents of the lectures
Space to go through them
Integral, space to ad own notes
Integral - space - Bones
detailed handouts but room for additional notes.
Brief handouts at the end of the lecture
Comprehensive handouts
Contains any diagrams

Ordered Information from All Student focus groups:

Concerning OHP's.

Use of diagrams and OHP's help make lecture interesting.
OHP's with diagrams and minimum amount of info used with handouts.
OHPs instead of dictating
Clear with good diagrams.
Clear OHP
Professional presentation with handout reflecting the same
Clear OHP's with not too much info on.
Clearly labelled OHP's
Clear minimum amount of information and diagrams
Readable
Clear, minimum info, diagrams and type set.
Clear OHP- diagram
Clear large OHP's
Minimum info - not the whole of war and peace

Ordered Information from All Student focus groups:

Concerning Lecturer's personal qualities.

Enthusiasm, interested in students
respect of lecturers towards students.
Lively personality of lecturers help to make lecture less stagnant.
Enthusiastic lecturers
Lively personality
Interested in students.
Good communication skills
Lecturers who communicate well with the group.
Approachable lectures
Lively personality and humours
Lively personality - keeps me awake.
Interested in the students.
Good communication skills.
Well organised.
Good communication skills
lectures should be able to read the students NVC e.g. should be able to see when students are bored and act upon it.
Approachable both during and after the lecture.
Approachable
Show students your interest in the subject
Lectures who speak from personal experience make the lecture more interesting
Approachable lecture who don't put you down if you ask them a question.
Good communication skills
Sarcasm avoided
Well tuned lecturer to the needs of the students.
Good communication skills.
Informal i.e. feel able to ask questions.
Good communication skills
Informal but feel respect.
Aware of student interest.
Approachable
Lively interesting personality.
Approachable
Good communication skills.
Sarcasm towards individuals avoided.
Aware of student interest.
Lively personality to make lecture interesting
good communication skills
Approachable
Lively enthusiastic and approachable especially with problems.
Projection of lecturers voice - too quite don't listen and don't understand.
An enthusiastic lecturer.
Lecturer punctuality.

Lecture should ensure why the lecture is required for the course so that students don't go home thinking " what the hell does this have to do with me."
Lecturer must be good communicator - e.g. clear explained, well.
Students should be able to approach lecturer e.g. be able to ask questions.
Enthusiastic delivery with intermittent delivery
Lecturer to be a good shaper of lecturer content and aims.
Good communication skills - the ability to put the point of the argument over in an understandable way.
Lively enthusiastic personality - to get the main points over in a fun way.
Good interaction with the students - sense of humour.
A lecturer with a voice which carries to the back of the room
Enthusiastic
Good communication skills
Good communication skills
Lecturer who seem bothered to lecture
Lecturers who make the lecture interesting.
criticism and interest in subject by tutor - lively personality.
Enthusiasm - friendly
Good communication skills
Lively, enthusiastic and good communication skills.
Good communication by the lecture
Enthusiasm for the subject
Sense of humour
Enthusiasm
Humour
A lecturer who is enthusiastic for the subject.
Enthusiasm of the lecturer
Must be cheerful and interested in whether or not the students are taking in the information.
Good communication skills
lively lecturer
Enthusiastic lecturer
Good communication skills.
Lively personality
Enthusiastic lecture
Sense of Humour
Enthusiastic about subject matter
Well prepared
Enthusiasm from the lecturer
Lecturer obviously having a good knowledge of the subject
Lecturer patient when asked what could be perceived as inane questions
Well prepared and able to use the equipment accurately e.g. OHP's
Interesting / enthusiastic
Appears to have prepared and not just making it up as they go along
Enthusiasm of tutor ability to add interesting items to enliven the most boring lecture
Sound knowledge base - able to look and describe in different ways from different angles and non - bias

Humour Empathic - notes boredom and restlessness and the need for refreshment and a leg stretch

Ordered Information from All Student focus groups:

Concerning tutor - student relationship.

Informality of both tutor / student relationship and style of lecture.
Informality but respect.
Approachable lecturers one to one or in a group.
Informal but a feeling of respect.
Informal.
Approachable
Lecture can be informal but the students should have some respect for the lecturer.
Interactively
Approachable - so that problems can be sorted quickly
Approachable
Informal atmosphere.
relaxed atmosphere.
Lecturers who are easy to talk to.
Approachable lectures
Informal delivery and interaction.
Approachable
Approachable
Informal but respectful
Approachable Lecturers are informal but have respect
Approachable lecturer
A relaxed but controlled atmosphere.
Approachable lecturer
Approachable in - touch lecturer
Approachable - you feel as though you can ask questions if you are not clear.
Friendly approachable and helpful
Informal style lectures
Approachable lectures
Communication between lecture and students
Approachable
Informal but respect.
Approachable
Approachable
Good communication with students and vice versa

Ordered Information from All Student focus groups:

Concerning lecture room.

Tier lecture room.
Good size lecture room - able to see everything.
Tier Rooms.
Bigger lecture room so have more space each
Tiered room
Tiered lecture room
Basic facilities of room, tiered with decent view of OHP
Tiered lecture room gives student more chance to see OHP
Lecturer theatres designed for the No of students attending i.e. adequate seating and acoustics.
Tiered lecture rooms - so that everyone can see and hear.
Well arranged lecture room with windows open to allow air in.
Tier lecture room
Tiered rooms
Tiered lecture room
Tiered lecture room

Ordered Information from All Student focus groups:

Concerning Student investment in lecture.

Personal interest in subject of the student.
Student interest e.g. scientific (lectures in which I have to think about.)
Should be given time to add input.
Students should be interested in the subject matter. Student interest
All students going (aiming) for the same goal.
Student interest
Personal interest in subject
Student interest
Good enthusiastic group of students able to interact in group work.

Ordered Information from All Student focus groups:

Concerning Style of lecture.

Variation of lectures style.
Interaction between lecturers and students.
A lecturer who realises when they have lost the interest of the students => break twice.
Feedback
Good communication between student and lecturer
Good structure that is a logical sequence of points.
Logical sequence.
Future timetable
Good explanation of subject.
Good logical structure
Good logical structure
Student participation when appropriate.
If drinks allowed in lecture room breaks not always necessary.
Full explanation in lectures - students allowed input.
Lecture structure - needs to be more logical and flowing.
Well organised - starts punctually
Students feel comfortable asking questions but lecturer does not allow too much discussion.
Prior information given about area to be covered so student is able to read up subject before lecture.
Well structured lecture in a logical sequence - where lecturer does not flit around from subject to subject like a butterfly.
Small seminar groups to follow up lectures.
Practical information which is available outside the lecture
Logical sequence to lecture - future references given one week before, so able to read up before lecture.
Quick review of last lecture before giving the next lecture.
Student input in lectures rather than just being talked to.
Logical sequence - not chopping and changing what is taught.
Lecturers to stress important points prevents misunderstanding of what is expected.
Reading lists for future lectures
Structure of the course (overall)
Seminars so students can give their input on lecture material.
Structure lectures that follow on from each other.
Lecturer who is precise and concise
Interaction
The ability to have a small debate without going of at a tangent
Well structured and explained lectures
Communication at all levels of intelligence
Organisation forward planning of the lecture subject to student
being advised which texts to read
summary of info into understandable dialogue

Bring the lecture down to the students level
Involving the students - getting them to think about and around the subject
Involving the students within lectures
A summary at the end of each lecture
Bringing lecture down to student level
Summaries at the end of lectures
Clear concise points made
logical structure
Combined use of note taking / ho (balanced)
Varied methods of information (Videos, HO and Visits)
Interesting topic
Organised structure to the lecture
Opportunity to express opinions (i.e. lectures ideas not forced on to us) - in the right places
Interactive approach
Professional presentation
Lecturers where reasonable control of group is kept to relevant subject area
Ability to take something from a lecture - handout structured notes, books to read.
Structured lecture - beginning outline, main bulk and conclusion (like ten o'clock news.

Ordered Information from All Student focus groups:

Concerning Technical Issues.

Use of video to back up lecture.
Good helpful diagrams.
Relevant use of videos
Clear audio - visual interaction.
Visual aids good use of
occasional use of video.
effective use of visual aids
Video use occasionally to break down the lesson and to reinforce the lecture we have just received
Use of visual aids e.g. videos
Video
Varied use of VA
Good visual aids OHP and diagrams - not scrawl on the board

Ordered Information from All Student focus groups:

Concerning Timing of lecture.

Lectures not first thing in the morning i.e. start 10/ 10.30 finish 1 / 1.30.
Tight time-tabling - taking into account Wednesday afternoon are for sport and people like to get away early on Fridays.
Future timetable for lectures.
Short lectures so you can take the info in
Well timed lectures not all packed into the last ten minutes.
Tight time-tabling i.e. not 2 hours each day but packed into full days leaving a free day for study.
Well timed lecture
Breaks between lectures
Timing of lectures - late morning onwards avoid early 9am starts.
Well timed lecture - should not be too early e.g. 9.00 am or too late e.g. 4.00 pm
Well timed lecture - appropriate breaks during lecture to give time to digest information.
Short breaks at frequent intervals.
Morning lectures
Hour long lectures with breaks between them
More responsive to lecture am.
Good time keeping
Well timed lecture which is evenly paced.
Breaks in lectures 5-10 minutes.
Reasonable speed in which lectures are delivered.
Like to know what is expected each month for the year.
Full day timetable no large gaps or just one hour.
AM lectures
Well timed lecture.
If hour lecture good if there are breaks in-between.
Well timed and don't over run.
AM lectures.
5 minute break in the middle
Steady speed at which the lecture moves on
Recognition of the importance of small breaks
5 minute break to absorb info
5 minute break to absorb info
Tight time-tabling, with no long gaps
Well timed lectures
Structured timetable - not just turning up for 1hr when it takes three hours to get to the lecture
Future time table structure
Well timed lecture
Timetable for next weeks lecture - so reading / preparation can be made.
Well timed lecture
late morning e.g. 10 ish

Student Interviews about experimental variables.

Aim of the interviews.

The central aim of the interviews was that they verified the students understanding of the research variables. What did they taken holistic, analytical student control and lecturer control to actually mean? Having such an explicit aim for the interviews allowed an image of the requirements of the interview design to be established. However, the requirements of the research did not fit neatly into a single research methodology, indeed it appeared to drawn upon many approaches but adhere completely to none. Such a position does not reflect a lack of rigour in the research design, but rather that within qualitative research there is an infinite variety of requirements and flexibility is need to accommodate this variety. Also qualitative research does not have the clear cut approaches that are recognised in quantitative research. Hence finding that research does not fit neatly into a universally recognised approach within qualitative research is not uncommon. Having noted this, the position that is adopted must be stated all the more clearly.

The date generated by the student interviews concerned their understanding of the research terms. The first consideration was the overall structure of the interviews, two main approaches to interviews are recognised standardised and non-standardised (Fielding 1993). Loftland (1971: 76), described the use of non standardised interviews as being, "to find out what kinds of things are happening rather than the frequency of predetermined kinds of things that the research beliefs has already happened." This instantly set the non-standardised at odds with the requirements of these interviews, gathering diverse information was not appropriate, the interviews were to be focused on the experienced variables and kept tightly to this. However, the closed nature of the standardised interview was also not appropriate for the research design, the reasons for this became clear within discussions presented by Stacey (1969: 80), "Closed questions should be used where the alternative replies are known, are limited in number, and are clear cut. Open-ended questions are used where the

issue is complex, where relevant dimensions are not known, and where a process is not known." Although the questions that are wanted to be investigated are known, the replies to them are certainly not limited or clear cut. Creating an emphasis towards more open questions. Patton (1987) argues for 'Style Combinations', noting that it is possible to combine the features of different approaches to research to establish a 'tailored' design. Patton clearly argues for the combination of approaches needed here, that is, " The combination of an interview guide with a standardised open ended approach". A position which Fielding (1993) refers to as the "Semi-standardised approach". Fielding describes the approach as " The interviewer asks certain major questions the same way each time, but is free to alter their sequence and to probe for more information. The interviewer is thus able to adapt the research instrument to the level of comprehension and discourse of the respondent." This compromise position between the two more dominant schools of thought allows the 'freedom within bounds' that this research requires. For the 'relevant dimensions' are known and the questions required clear cut. However, 'room' is needed for the variety of possible responses to these questions. For although the questions are clear cut, the responses need not be.

The use, that the generated data was to be put to, was to confirm students understanding of the research terms, this has implication for the design of the interviews. This meant that there was the desire to generalise from the collected data and a belief that the data would be independent of the setting and interviewer. In line with the recognition that data can be generalised a positivistic stance was established and an interview protocol developed. A standard which would develop a foundation for reliable and valid inference. However, the limitations of a positivist stance were also noted within the design of the interviews, these limitations are distilled within the work of Denzin (1970), self presentation, the notion that there is an ideal, which the interviewer is trying to discover and interviewee trying to fit model. Lack of commitment on the part of the interviewee, as the research is often quite distant or esoteric to the participant the responses generated may not reflect their true position or opinion. Within a positivist interview there is a clear status divide between the interviewer and interviewee, which can reinforce the self presentation of the

participants. Finally Denzin highlights the importance of the interview context on the subsequent content of the interview, the environment can still further reinforce the need to present a specific image to the interviewer. Denzin argues for a more open strategy when interviewing to help overcome these limitation and the embracing of a more interactionist approach.

It was felt that the problems presented by Denzin about the positivistism within interviewing were valid and a position would have to be adopted which overcame these difficulties. Mainly this was done by the relationship that existed between the participants and the researcher developed before the interviews. Due to fact that the students had already engaged with the research and invested their time and opinions, the issue concerning the interview topic being 'esoteric or distant' was overcome. Both as a researcher and as a tutor, a positive relationship had been established between the students and tutor, over a number of weeks. While not completely overcoming the imbalance in the relationship between interviewer and interviewee, the established rapport greatly tempered the interaction towards a more even balance. This long term relationship also had the effect or reducing 'self presentation' as all the interviewees had interacted with the interviewer at length. As well as the positive working relationship personalised questions were also used to aid open and frank discussion of the interview topics. Fielding (1993) reports that underlying attitudes are more effectively tapped if the respondent is asked, "to tell you about their experiences". To aid this feeling of personal experience it was clearly stipulated to the interviewees, that there were no right or wrong answers and the interviews were interested in their understanding.

Pilot interviews are often need at the beginning of a programme of interviews, in order that an agenda and plan can be established for the later interviews which is more precise than an general overview. In this case it was felt that pilot interviews were not necessary as the plan for the interviews was generated by the results and design of the study. That is direct information was required from the students concerning understanding of the research variables. It was not necessary to clarify or focus this further. It was also recognised that the approach that was being adopted

was a semi-structured one, which would allow any relevant information to come to the fore as a dynamic part of the interviews. Fielding (1993) notes that this is one of the "major attractions" to this type approach to interviews.

Insight into student discourse surrounding the experimental variables.

A subsidiary aim of the information was to gain an insight not only into the understand the students had about the research terms but also the 'phraseology' and concepts associated with the terms by the students. This would allow the researcher to gain a better understanding of the research terms. Broadening the narrow academic understanding to include more 'common' understanding. Such information would be of use when trying to establish 'generalisable' models or concepts from the research, models which may be limited by the confines of academic terminology.

Design of interviews.

Interview Procedure.

1. An interview guide was established which simply stipulated that the interview should gain the students opinions on the four research variables, Holistic, analytic , student control and lecturer control.
2. The interviews were carried out in the seminar room after a class.
3. The interviews were recorded with the permission of the interviewees in order that full transcripts could be generated later.
4. No clip board or similar was used with the schedule on. Predominantly to avoid the establishment of stereotypical interviewer/interviewee relationships, this was facilitated by the simple nature of schedule.
5. The interviews lasted approximately 30 minutes.

Analysis Procedure.

1. The interviews were transcribed in full for verbal content.
2. The original interviews were rephrased by the research so that a thorough understanding of the content was established.
3. Based upon the understanding developed common themes were established that linked the comments together.
4. Using the common themes generated the original student transcripts were assigned to theme areas to support the validity of the themes generated.
5. The student comments for each area were then summarised for each theme area.

Approach to Analysis.

Although the logic of the research procedure was sound there were some inherent issues within the approach which must be recognised, in order to avoid compromising the data gathered. The general procedure was one of comparative analysis. The comparison is needed within the analysis in order to support possible future generalisations. Care had to be taken when carrying out the comparisons not to," Forcibly smooth the diversity in front of us." (Miles and Huberman, 1994: 207) The diversity of the comments was integral to the research and not a hindrance to it. However, recognising the principle and carrying out the practice are not necessarily synonymous, hence a number of procedures were introduced into the analysis to compensate for the possible 'smoothing' effect. Mishler (1986), noted the importance of avoiding aggregation, that is simply lumping data together based on superficial "similarities or differences". This first points appears obvious and something which would be designed out of any rigorous analysis procedures. However, Mishler highlighted a more subtle aggregation that could invalidate any conclusion based on comparative analysis. That is, during analysis often the data is broken down into fragments which are perceived as being distinct, these fragments are then assembled into categories, it is at this point that Mishler warns negative aggregation can occur, "

When the responses are reassembled ... the results are artificial aggregates that have no direct representation in the real world of communities, social institutions, families, or persons." (p.26) To ensure that such aggregation does not occur during the analysis, all comments were kept in whole sentences or phases which conveyed the essence of what was expressed. Thus at all time the phrasing and meaning of the interviewees was kept. The consequences of this was that potentially a single phase may be assigned to a number of theme areas (although in practice this did not occur.) Keeping the whole phrases allowed the perspective of the students to be kept within the analysed data, for at all times meaning was kept in favour of tighter word or concept categories which may loss the original essence of what was said.

Although the above allowed for possible aggregation, the issue of forced categories still remained. For although the themes kept the essence of what the students expressed, the categories themselves may be forced onto the data rather then being inherent within the data. McPhee (1990) noted that it was false to assume that the data gathered contained a fully comparable set of issues. As if dependant and independent factors within the interviews were standard. While recognising the potential variety within the data cannot be ignored, there will be points of contact between the interviews. Points of contact which Abbott's (1992) described as being grounds for establishing a "generic narrative model." The analysis therefore did attempt to establish categories, but in order to negate a rush towards simple ordered categories, contradictory categories were also sort. Sometimes these were established and built into the analysis, allowing the diversity of opinion to be reflected. This adhered to a note made by Miles and Huberman (1994), that is, "The cases that do not fit your explanations are your friends. They surprise you, confront you, and require you to rethink, expand and revise your theories." A unified neat explanation of the interviews was not sort contradictory information was embraced and information that was not open to be categorised was included and discussed and not cast out or ignored as errors.

Categorised Student Comments.

C1 Student - Participation

1. Sometimes I like the bits where you asked us questions but Tuesday mornings is after student nights at the clubs and well you know, I just want to be quiet.
2. Student ones they're more difficult, sometimes when you are alert they are a real buzz 'cause you don't have to just listen and the questions can focus you, if not in the lecture when you do the revision.
3. For these type of reason I enjoyed the student controlled lectures, these allowed me to really engage with the material and make the topic my own. I didn't feel embarrassed when I wanted to ask a question or make you go over a bit again.
4. The student control was like the interactive version, everything seems to be interactive, but I suppose that's what it was interactive.
5. The idea that there were set question sessions made you think that you would come up with a question, I once made a note to ask a questions but didn't in the end.
6. Well it was too similar to another, but it didn't matter, the good thing is that you think to question the topic, err don't sit there as if it is right.
7. Questions are quite a good idea, they make you think about the topic and what it means but often some of the questions are really stupid.
8. Student control is more about discussing a topic than a lecture, if you did this in a seminar or something like that it would be good, I do like asking questions, but it can get in the way of getting the work done.

C2 Student - Too Much participation.

1. Let's face it what does the rest of the group know about the area. X likes to shot his mouth of a bit and sits there as if he knows it all but when push comes to shove like, he knows no more than me.
2. But at other times they drag because the same people mouth of and I sit there think what the hell do they know. I suppose I shouldn't but I do.

3. I could see student control getting a bit out of hand especially with some people who seem to always want to ask questions, they seem to just want to ask the questions if you ask me

4. The way people could keep asking question, that got on my nerves a bit, I kept thinking this is giving lain less time to do the lecture.

5. Yes, but, yes, that was a good thing occasionally it was helpful to ask questions, it was just that at times there seemed to be to many.

C3 Student - Overviews.

1. The idea in the student one to have overviews and summaries is a good one, it's not like you have forgotten what has gone on during the lecture but if at the end you can check what notes you have against something else, it's good.

2. We, the group were given an insight into the topic area before the start so we knew what was coming, this help me keep up with the lecture and I felt more able to ask questions I suppose because I knew a bit more about the topic

3. It was good that you knew what was coming up, you could make connections with the stuff and it made more sense.

C4 Lecturer control Order security.

1. Me, I'm always in for lecturer control you feel like you are, feel like you are getting your moneys worth.

Safe that's one thing you could say about the lecturer control, safe it was planned and that's good.

2. Clear, controlled, safe that's a lecturer one.

3. The lecturer was good, I was confident that I would get all the information that I needed.

4. Well, well lecture control was all about the lecturer giving out the information in a very controlled way, you knew you would get all the stuff because you are a good lecturer and know your stuff,

5. Right, The non verbal lecture that was lecturer control because there was no time for questions and we had to wait for you to tell us things.

6. I think lecturer control would be good when you are first years and don't know what to do, it keeps the lectures on target, Yer and it also keeps X quiet, god in biochemistry she's always asking questions and they are always - 'listen to me' style questions.

7. When you had tighter control it was better because you really could get on with the lecture.

8. Lecturer control is about keep the class on the topic, getting the information done, not going off at a tangent due to a series of stupid questions.

C5 Lecturer Control Negative.

1. But the lecturer control sometimes frustrated me, as I wanted to try the ideas out and I wasn't given the chance, I would have enjoyed being asked more questions and solved more problems with the new stuff I'd just got.

2. Now that I think about it, you made us wait for the information and this prevent us from questioning because, Well I'm always worried that I'll ask a question about something you are just about to say.

3. The lecturer control was good perhaps it would be good for really new stuff but I'm not sure.

4. It felt a bit false really, well no bad but well not like you, but the lecture was good.

5.I didn't like the fact that I didn't know what was coming up though, That wasn't a good idea, it would have helped me to know, I would have felt more at ease, knowing that I was getting the information down.

C6 Holistic Whole.

1. Holistic is all about looking at the big picture, recognising that the world isn't cut up into these like, like, sort of bit size chunks
2. It's about how the information fits together, the picture as a whole not as the parts.
3. Well. the information was all linked together often around a single example, like that speech. This made it more open and easy to follow, it didn't keep going off at tangents.
4. But the holistic lectures they made sure that the information was sown up into a clear image of a topic area, not just a list of information which links with an area.
5. Knew it was, you told us the stuff but it somehow felt related to other to the rest of it for real.
6. The holistic lectures linked the stuff together made me realise that the theory was out there not in here.
7. Right, we are often given theories but how do we know they are true or not, we don't but in the holistic theories you tried to show that they were true. Well not true, but real, well, oh I don't know do you get what I mean?
8. Oh I don't know, well no, it was because you made the connections in the lecture that I thought to make them. It wasn't that I couldn't have made them on my own, it was just that I might not have thought to make them that's all.
9. But it was good to show how the information related to other things. It would have been good to have had all the topics in both styles, 'cause they both have something to offer.

C7 Holistic Everyday.

1. But as a nurse I felt I could use the holistic lectures, well use the holistic lectures as a nurse.

Well it's not often on the ward I'm going to be asked who did study X in year Y, but it might me useful to know that patients feel more able to talk if you make good eye contact.

2. Like at first When you read out that bit of Shakespeare I thought you were being stupid, it just didn't seem relevant but by the end of the lecture I saw in that one bit

and like in all conversation there are these elements of language in operation, working like constantly. It was good.

3. Erm, well I saw the holistic lectures as the more open lectures they seemed to cover the material in a real' sort of way,

4. it was just that they seemed to be about issues that could be used.

just that they were more everyday, the examples given and the way the material was put together.

5. About trying to bring the topic together, place it in a real context, like it is.

6. No. It's well when the lecture is open to all types of information not just the text book information but the real world information too. Well in some lectures you feel as if the information is just there in the lecture room. The holistic lectures take it from outside as well. In many ways it is more honest really, doesn't make things too easy. Like the lecture on language, it showed me that I knew all the information already, if the information was true for that speech then it was true for me. That doesn't mean that it was bad, it was a good lecture it just gave me the labels for what I already knew.

Another feature that was identified by the students within the holistic lectures was the use of more 'everyday' style examples within the lectures. The students perceived this as making the lectures/topics more "real". The consequences of this was the information appear to "come of outside as well" and not be limited to a purely academic frame work. In turn this broadening of the academic base allowed the students to perceive the lectures as more universally applicable, "seemed to be about issues that could be used."

C8 Holistic Negative.

1. Well no, you had to work with it more it wasn't as clear, it didn't cut through the irrelevant information as well.

C9 Analytical Parts.

1. Here you got the clear cut points, the central theme but really you knew it wasn't the whole story.
2. When the analytical lectures were clear point by point affairs. They sort of took you through it step by step.
3. The analytical lectures, they were more straight forward, we had the facts and the theories given to us. It was really clear. First this then this, then it was all cut down.

C10 Analytical Academic.

1. My mate X said that this type of lecture was better for exam and I suppose he's right. The information was like what you put in an exam, a list of the important things.
2. I think if you brought someone who had never been to university they would get more from an analytical lecture. There less frightening than other lectures. Lectures that you have to learn to cope with rather than naturally cope with.
3. I saw them like proper academic lectures, you really should have worn a bow tie. They focused on the theoretical information. This sometimes made them a bit difficult. But I knew this was the proper information, that would be useful in exams.
4. I think that the analytical lectures were better through.

C11 Analytical Negative.

1. I thought they were a bit patronising, Oh not you, I know it was research but they seemed to treat you a bit like an A-level student, you didn't have to think just note down the most important points. I'm not sure if that is bad, lot's of my friends seemed to like them, they like the notes I think. Sometimes I got a bit bored but you did try and make them interesting.

C12 Difficult

1. Oh I don't know they both are OK.
2. Like neither one has the answer they just have a different good bits.

3. I knew it, well it's funny because right, at the beginning of the lectures we had a debate about this. Well you know all us who sit at the back. Because none of us really knew what it meant.
4. Oh God this isn't making any sense is it. It's really difficult.
5. Oh, oh, ermm. That's not easy.

C13 Implicitly Known.

1. Funny that because I had never really heard of the word until I saw it on the questionnaire but I didn't really need to ask what it meant. It was sort of obvious after the lecture, like those ring in quizzes that give you the answer in the question.
2. Yer, yer, but we didn't know what it meant but we all had an idea, you know?
3. I couldn't and neither could they give a formal definition, something you could put in an essay but we all felt it referred to the same type of thing.
4. I didn't just randomly fill in the questionnaires, there was a difference, it is just difficult to actually say what it was.

C14 Adapt.

1. It's a bit of a mess I suppose so, But that doesn't mean you can't understand it like that but rather you have to look at it differently.
2. Well if you sat in one of those holistic lectures desperately trying to see just the relevant facts you would have like, a real difficult time right. The information just 'ait like that.
3. So you have to take what you can from it not expect something to be there.

C15 Skills of Tutor

1. I'm not sure anyone else could have got away with it, if it had been some of our other tutors I would have switched off. But I suppose I gave you the benefit.
2. No I didn't mean it like that, I was just say sometime the out come isn't always obvious but that doesn't mean it's wrong.
3. Oh, I'm not saying you go off at tangents, but like X they keep going off onto a new topic and after a while you simply give up.
4. You did this well you were never bossy as some lecturers are and we always seemed to have a laugh.
5. You do that well, some lecturers treat you as if you are stupid or repeat the bit exactly the same again, you tried to see the problem from my point of view, well not just me, when anyone asked a question you tried to really answer it.
6. You did it well, I liked all your lectures.

C16 None categorised comments from students.

Interview One.

Well it was sort of like, well chalk and cheese really, I can't believe I 'just said that, but you know what I mean.

Oh yer, but you know what I mean.

Interview Two.

I don't know what do you mean?

it wasn't that they were made easy or something, the stuff was on a par with the rest of the course

Oh I was not saying they were better or anything the analytical ones were good too,

Interview Three.

At times can't help thinking that what we learn is like just hoops. If you can learn this then you are able to do this. But in some of your holistic lectures, the one on language was like that for me, was that holistic.

No they were different, they weren't on the same thing like.

Oh they were good, which lectures were they again.

Oh I liked that mass media it was a bit of a change.

Is that all right.

Yer right, stuff you know what I mean.

Interview Four.

They didn't matter as much, well not for me anyway.

Students' Understanding of Research Terms.

Below are the transcripts of brief interviews with four students off the Nursing degree course. The aim of the interviews was to get an insight into students conceptions of the main experimental variables used in this study, that is holistic and analytical style, student or lecturer controlled presentation. The study has failed to gain any significant difference in students responses to the experimental lectures, no benefit having been noted for attuning lectures to learning styles. It was possible this was due to radically different interpretation of the experimental variables by each of the learning styles. However, it must be noted that the styles of the lectures were perceived by the research population in accordance with the experimental design. It is possible that there still is a significant difference in the perception of styles of the experimental lectures, any differences will hopefully be brought out by these interviews.

Four students were selected for the interviews one from each of the four learning styles. The students were selected randomly from within each learning style group. Of the four students asked to partake in the interviews one declined due to child care commitments, another student was identified from that learning style group and this student accepted.

The interviews lasted approximately 30 minutes and were tightly focused on the gaining information about the main experimental variables. Only four main questions were asked; What do you understand by the term analytical in relation to the lectures presented? What do you understand by the term holistic in relations to the lectures presented? What did you take the term student control to refer to in relation to the lectures presented? What did you take the term lecturer control to refer to in relation to the lectures presented?

The interviews were conducted in the seminar room after the end of the seminar, the interviews were tapped, with the agreement of the four participants. No interview schedule was used as the interviews were relatively short and the interviewer felt no

need for any prompts. The interviews were carried out one after the other and the participants who had finished the interview were asked not to discuss the interview questions those who had not yet been interviewed. In order to avoid the response of later participants to be biased by the attitudes and opinions of the initial participants.

The participants organised among themselves the order in which they were going to be interviewed, based on other commitments. The order with reference to learning styles was converger, accomodator, assimilator and diverger

Interview One.

Q. I'm just try to get an insight into what the students understood about the terms used on the questionnaires about the lectures. There's no right answer, or wrong answer for that matter so whatever you think is appropriate, so don't censor your answers. The first thing I want to discuss is the term holistic what did you take it to mean in relation to the lectures?

A. Funny that because I had never really heard of the word until I saw it on the questionnaire but I didn't really need to ask what it meant. It was sort of obvious after the lecture, like those ring in quizzes that give you the answer in the question. Holistic is all about looking at the big picture, recognising that the world isn't cut up into these like, like, sort of bit size chunks. It's a bit of a mess I suppose so, but that doesn't mean you can't understand it like that but rather you have to look at it differently.

Q. In what way differently?

A. Well if you sat in one of those holistic lectures desperately trying to see just the relevant facts you would have like, a real difficult time right. The information just 'ait like that. It's about how the information fits together, the picture as a whole not as the parts. So you have to take what you can from it not expect something to be there.

Q. How does this impression differ from the one for the analytical presentations.

A. Well it was sort of like, well chalk and cheese really, I can't believe I 'just said that, but you know what I mean. Here you got the clear cut points, the central theme but really you knew it wasn't the whole story. My mate X said that this type of lecture was better for exam and I suppose he's right. The information was like what you put in an exam, a list of the important things. But as a nurse I felt I could use the holistic lectures, well use the holistic lectures as a nurse. Do you know what I mean?

Q. Not sure really?

A. Well it's not often on the ward I'm going to be asked who did study X in year Y, but it might me useful to know that patients feel more able to talk if you make good eye contact. Like at first When you read out that bit of Shakespeare I thought you were being stupid, it just didn't seem relevant but by the end of the lecture I saw in that one bit and like in all conversation there are these elements of language in operation, working like constantly. It was good. I'm not sure anyone else could have got away with it, if it had been some of our other tutors I would have switched off. But I suppose I gave you the benefit.

Q. Flattery will get you everywhere.

A. No I didn't mean it like that, I was just say sometime the out come isn't always obvious but that doesn't mean it's wrong.

Q. Moving onto the issue about control, what were the differences for you between the lecturer controlled and the analytical presentations?

A. Me, I'm always in for lecturer control you feel like you are, feel like you are getting your moneys worth. Let's face it what does the rest of the group know about

the area. X likes to shot his mouth of a bit and sits there as if he knows it all but when push comes to shove like, he knows no more than me. The idea in the student one to have overviews and summaries is a good one, it's not like you have forgotten what has gone on during the lecture but if at the end you can check what notes you have against something else, it's good. Sometimes I like the bits where you asked us questions but Tuesday mornings is after student nights at the clubs and well you know, I just want to be quiet. Safe that's one thing you could say about the lecturer control, safe it was planned and that's good. Oh I don't know they both are OK.

Q. Don't worry I'm not asking you to pick which one you thought was best but rather just what each one meant to you.

A. Oh yer, but you know what I mean. Like neither one has the answer they just have a different good bits. Clear, controlled, safe that's a lecturer one. Student ones they're more difficult, sometimes when you are alert they are a real buzz 'cause you don't have to just listen and the questions can focus you, if not in the lecture when you do the revision. But at other times they drag because the same people mouth of and I sit there think what the hell do they know. I suppose I shouldn't but I do.

Q. Thanks that's been really helpful, it's difficult for me to see if the student opinion mirror my own and all the information I can get helps. Thanks.

Interview Two.

Q. I'm trying to get an insight into what the students understood about the term used on the questionnaires about the lectures. Don't worry about giving a correct answer, as there isn't one. Just try and tell me just how you felt. The first thing I want to discuss is the term holistic what did you take it to mean in relation to the lectures?

A. I don't know what do you mean?

Q. Well, when you had to decide on the first question of the questionnaire whether the lecture was more toward the analytical or holistic end of the continuum, what informed you choice?

A. Erm, well I saw the holistic lectures as the more open lectures they seemed to cover the material in a real' sort of way, it wasn't that they were made easy or something, the stuff was on a par with the rest of the course it was just that they seemed to be about issues that could be used.

Q. What the topics were more useful or the way the information was presented was more useful.

A. Oh I was not saying they were better or anything the analytical ones were good too, just that they were more everyday, the examples given and the way the material was put together. I think if you brought someone who had never been to university they would get more from an analytical lecture. There less frightening than other lectures. Lectures that you have to learn to cope with rather than naturally cope with.

Q. How were they made more open'?

A. Well. the information was all linked together often around a single example, like that speech. This made it more open and easy to follow, it didn't keep going off at tangents. Oh, I'm not saying you go off at tangents, but like X they keep going off onto a new topic and after a while you simply give up. But the holistic lectures they made sure that the information was sown up into a clear image of a topic area, not just a list of information which links with an area.

Q. How did this image of holistic lectures differ from the analytical lectures?

A. When the analytical lectures were clear point by point affairs. They sort of took you through it step by step. I thought they were a bit patronising, Oh not you, I know it was research but they seemed to treat you a bit like an A-level student, you didn't have to think just note down the most important points. I'm not sure if that is bad, lot's of my friends seemed to like them, they like the notes I think. Sometimes I got a bit bored but you did try and make them interesting.

Q. I tried to present the information in two different way, with a lecturer control bias or a student control bias. How did you distinguish between the two?

A. The lecturer was good, I was confident that I would get all the information that I needed. You did this well you were never bossy as some lecturers are and we always seemed to have a laugh. But the lecturer control sometimes frustrated me, as I wanted to try the ideas out and I wasn't given the chance, I would have enjoyed being asked more questions and solved more problems with the new stuff I'd just got. For these type of reason I enjoyed the student controlled lectures, these allowed me to really engage with the material and make the topic my own. I didn't feel embarrassed when I wanted to ask a question or make you go over a bit again. You do that well, some lecturers treat you as if you are stupid or repeat the bit exactly the same again, you tried to see the problem from my point of view, well not just me, when anyone asked a question you tried to really answer it.

Q. Could you really try and focus on what exact features distinguish lecture from student control?

A. Well, well lecture control was all about the lecturer giving out the information in a very controlled way, you knew you would get all the stuff because you are a good lecturer and know your stuff, Now that I think about it, you made us wait for the information and this prevent us from questioning because, Well I'm always worried that I'll ask a question about something you are just about to say. The lecturer control was good perhaps it would be good for really new stuff but I'm not sure. The student control was like the interactive version, everything seems to be interactive, but I suppose that's what it was interactive. We, the group were given an insight into the topic area before the start so we knew what was coming, this help me keep up with the lecture and I felt more able to ask questions I suppose because I knew a bit more about the topic. I could see student control getting a bit out of hand especially with some people who seem to always want to ask questions, they seem to just want to ask the questions if you ask me. You did it well, I liked all your lectures.

Q. Thanks that was great, I'm just try to see if your opinions mirror my ideas about the area so thanks for your input.

Interview Three.

Q. I'm carrying out this set of interviews to gather student opinion about the terms used about the lectures. Holistic and all that, don't worry about there being a correct answer, it's your opinions I'm after. The first thing I want to discuss is the term holistic what did you take it to mean in relation to the lectures?

A. I knew it, well it's funny because right, at the beginning of the lectures we had a debate about this. Well you know all us who sit at the back. Because none of us really knew what it meant.

Q. I did try and make it OK for you to ask questions while filling in the questionnaires.

A. Yer, yer, but we didn't know what it meant but we all had an idea, you know?

Q. No.

A. I couldn't and neither could they give a formal definition, something you could put in an essay but we all felt it referred to the same type of thing.

Q. What's that?

A. About trying to bring the topic together, place it in a real context, like it is. At times can't help thinking that what we learn is like just hoops. If you can learn this then you are able to do this. But in some of your holistic lectures, the one on language was like that for me, was that holistic.

Q. Yes.

A, Knew it was, you told us the stuff but it somehow felt related to other to the rest of it for real. Oh God this isn't making any sense is it. It's really difficult. I didn't just randomly fill in the questionnaires, there was a difference, it is just difficult to actually say what it was.

Q, Perhaps it would be easier to say what was different about the analytical and holistic lectures?

A. The analytical lectures, they were more straight forward, we had the facts and the theories given to us. It was really clear. First this then this, then it was all cut down.

Q. So the holistic lectures weren't as clear?

A. No they were different, they weren't on the same thing like. The holistic lectures linked the stuff together made me realise that the theory was out there not in here. Right, we are often given theories but how do we know they are true or not, we don't but in the holistic theories you tried to show that they were true. Well not true, but real, well, oh I don't know do you get what I mean?

Q. Yes, it's really clear, it's all good stuff, don't worry.

A. Good.

Q. The next thing I after is the variable to do with control, remember lecturer or student control. How did you distinguish between the two?

A. Right, The non verbal lecture that was lecturer control because there was no time for questions and we had to wait for you to tell us things. It felt a bit false really, well no bad but well not like you, but the lecture was good. I think lecturer control would be good when you are first years and don't know what to do, it keeps the lectures on target, Yer and it also keeps X quiet, god in biochemistry she's always asking questions and they are always - 'listen to me' style questions.

Q. Before we completely character assassinate X, what did you think of the student control?

A. Oh they were good, which lectures were they again.

Q. Mass media and effective decision making.

A. Oh I liked that mass media it was a bit of a change. The idea that there were set question sessions made you think that you would come up with a question, I once made a note to ask a questions but didn't in the end.

Q. Why not?

A. Well it was too similar to another, but it didn't matter, the good thing is that you think to question the topic, err don't sit there as if it is right. It was good that you knew what was coming up, you could make connections with the stuff and it made more sense. Is that all right.

Q. Yes great, remember in the exam I want plenty of that 'stuff'.

A. Yer right, stuff you know what I mean.

Q. Sure thanks for your help.

Interview Four.

Q. I'm trying to get an insight into what the students understood about the term used on the questionnaires, things like holistic and analytical. I'm not after a dictionary definition, just your understand of the term. Holistic, what did you take it to mean, in relation to the lectures?

A. Oh, oh, ermm. That's not easy. No. It's well when the lecture is open to all types of information not just the text book information but the real world information too. Well in some lectures you feel as if the information is just there in the lecture room. The holistic lectures take it from outside as well. In many ways it is more honest really, doesn't make things too easy. Like the lecture on language, it showed me that I knew all the information already, if the information was true for that speech then it was true for me. That doesn't mean that it was bad, it was a good lecture it just gave me the labels for what I already knew.

Q. Would that have been true if the lecture had been more in an analytical style?

A. Oh I don't know, well no, it was because you made the connections in the lecture that I thought to make them. It wasn't that I couldn't have made them on my own, it was just that I might not have thought to make them that's all.

Q. How did this differ from the analytical lecture?

A. I saw them like proper academic lectures, you really should have worn a bow tie. They focused on the theoretical information. This sometimes made them a bit difficult. But I knew this was the proper information, that would be useful in exams.

Q. Was the holistic information not as useful then?

A. Well no, you had to work with it more it wasn't as clear, it didn't cut through the irrelevant information as well. But it was good to show how the information related to other things. It would have been good to have had all the topics in both styles, 'cause they both have something to offer. I think that the analytical lectures were better through.

Q. I also tried to manipulate the type of control within the lectures between lecturer and student control, what did you think about these features?

A. They didn't matter as much, well not for me anyway. The way people could keep asking question, that got on my nerves a bit, I kept thinking this is giving lain less time to do the lecture.

Q. You did ask quite a few questions though.

A. Yes, but, yes, that was a good thing occasionally it was helpful to ask questions, it was just that at times there seemed to be to many. Questions are quite a good idea, they make you think about the topic and what it means but often some of the questions are really stupid. When you had tighter control it was better because you really could get on with the lecture. I didn't like the fact that I didn't know what was coming up though, That wasn't a good idea, it would have helped me to know, I would have felt more at ease, knowing that I was getting the information down.

Q. If you had to sum up lecturer and student control what would it be?

A. Lecturer control is about keep the class on the topic, getting the information done, not going off at a tangent due to a series of stupid questions. Student control is more about discussing a topic than a lecture, if you did this in a seminar or something like that it would be good, I do like asking questions, but it can get in the way of getting the work done.

A. Thanks that was really good, thanks for your time.

Generation of Categories.

After the interviews had be totally reworded to allow the researcher a thorough understanding of the transcripts, categories were generated which linked the comments together and allowed general opinions to be brought to the fore. The categories were created based directly on the comments of the students, resulting in a category for each question and a category covering other important issues.

Experimental variables and their associated student generated categories.

Student Control
- Positive participation issues.
- Too much participation.
- Merits of overviews.

Lecturer Control
- Order and Security.
- Frustration with lecturer control.

Holistic Style
- The whole.
- Everyday material.
- Negative comments.

Analytical Style
- Point by point.
- Academic emphasis.
- Negative comments.

Other Issues Raised
- Difficulty of answers.
- Implicitly known.
- Adapt to lecture.
- Skills of tutor.

The comments from which these categories are developed can bee seen in methodology appendix page .The original student comments are used for this not the researchers re-wording of the comments.

Differences in learning style comments.

It was not the case that the interpretations of the experimental variables differed between the learning styles. Although there were an occasional difference emphasis placed on a variable, these did not constitute substantive differences in the opinions of the learning styles. For this reason the attempt to present learning styles understanding of the experimental variables were abandoned, as it was felt creating such categories would vastly over emphasise the differences between the learning styles, effectively causing a type of aggregation (Mishler, 1986.) which would not represent the two situation.

Interpretation of categories in relation to the experimental variables.

Student control was interpreted by the students as being a time where they were able to actively participate in the lectures (See methodology appendix, categorisation C1). A reported consequence of this participation was that the students felt that the environment, "make[s] you think", the material presented had to be engaged with rather than just noted. One student perceived that "[student controlled lectures] allow me to really engage with the material and make the topic my own." The allotted question sessions were perceived as giving a "focus" to the lectures, which could add clarity to the lecture and to the revision afterwards.

However, students did highlight that there was a fine balance between useful participation and allowing students to dominate a lecture (See methodology appendix, categorisation C2). Although participation and allowing students to ask questions was

generally recognised as theoretically a good idea, students reported a lack of trust in other students to be able ask useful questions, this concern was typified by the statement, "Let's face it what does the rest of the group know about the area". This fear of useless information was supported by the idea that it was the lecturer who was able to teach about the subject, "I kept thinking this is giving Iain less time to do the lecture." implying the students had little to add. It is difficult to discern from this information whether the concern with the quality of peers additions to lectures was a product of the relatively novel nature of allowing students to actively participate in lectures or a deep seated mistrust of this type of lecture format. Clearly from these comments it can be deduced that student participation has to be effectively staged managed in order that it contributes to the lecture and does not dominate it.

One feature which was positively regarded about the student controlled lecture was the use of initial overviews of the lecture topic (See methodology appendix, categorisation C3). The overviews which were built into the student controlled lectures were reported as allowing the students the opportunity to engage with the topic more easily, "[it] helped me keep up with the lecture and I felt more able to ask questions." Another reported benefit was that the overviews could be used as a standard to assess what was gained from the lecture. Students perceived that they had gained a level of control by being informed of the lecture topic and lecture plan. This meant that they could asked informed questions, rather than have to guess whether the question was part of the next section to be presented.

It is clear that the student picked up on the relative nature in the distribution of control. No student interpreted student control as meaning that they dominated or presented the lecture. Rather the consensus appeared to be that student control was a situation where the students were able to more actively engage with the lecture topic, abandoning a purely passive approach to lecturing.

Lecturer control.

Lecture control was associated by the students with a feeling of security and order, both of which inspired confidence in the students (See methodology appendix, categorisation C4). This security was based on the perception that because the lecturer had taken responsibility for the material presented, "I was confident I would get all the information." The general impression was established that the lecturer knows what needs to be done, if they are able to do this without interruption from students effective learning will take place. Thus the students "really could get on with the lecture". The students appear to indicate that the lecture is expected to engage with the lecture topic for the students, collating and ordering information into manageable and relevant chunks.

This 'gatekeeping' on the part of lectures did create difficulties as well. Although lecturer control was associated with security it was also reported as being "frustrating"(See methodology appendix C5). Similar basic features were cited as the cause, that is, the dependence on the lecture and the lack of information the students had about the lecture before hand. It was perceived that these features prevented students from "trying the ideas out." One student also noted that they felt that this type of lecture was "a bit false", as they perceived they were more distant to the lecturers 'natural style'. However, they did still noted that the lectures were good.

Lecturer control is seen as having clear benefits which are not to be found within a student controlled lecture environment. From what has been developed from the student comments it may be the case that lecturer control is a good format to introduce new topics, as it is a secure environment which would support the students as they are introduced to the topic.

Summary of interpretation of lecture control.

The control types used within the lectures have been distinctly identified by the student population, both of them having merits which justify student rating them highly. It was not the case that students simply rated all the lectures the same or were

using the same criteria to judge all lectures. It appears that all four learning styles are able to identify the benefits within both types of lecture control and find it a rewarding environment. It does appear that some types of control may be more appropriate for delivery of certain types of material, however this transcends the boundary of this study and any suggestions in this area would be purely speculative.

Style of Presentation.

Holistic style.

A dominant theme within the reporting of holistic lectures was that they presented a "clear image of the topic", "the big picture"(see methodology appendix, categorisation C6) . The student perceived that this image of the whole was created by the "links" that were made between the topics, recognising, "the world isn't cut up into these .. bite sized chunks". The consequences of this creation of a whole and the links between the information was that the students perceived it as more "real" and the lecturer actively making links within the topics encouraged the students the students to establish similar links within the material. Holistic lecture appears to be perceived as the least academic style of lecture, one which is more open in it's use of language and concepts than a traditional 'high brow' lecture. Depending on where ones political and philosophical position on academia is this can be perceived as a benefit or a pitfall of the style. All the student however, were able to recognise the benefits in this approach to lecturing, indicating that political concerns of education may not be that pertinent to those engaged within it.

The open liberal interpretation of Holistic lectures was compounded by another feature that was identified by the students within the holistic lectures, that was the use of more 'everyday' style examples within the lectures (See methodology appendix, categorisation C7). The students perceived this as making the lectures/topics more "real". The consequences of this was the information appear to "come of outside as well" and not be limited to a purely academic frame work. In turn this broadening of

the academic base allowed the students to perceive the lectures as more universally applicable, "seemed to be about issues that could be used."

There was only one negative comment about holistic lectures (See methodology appendix, categorisation C8) focus on the fact that the holistic lectures did not compartmentalise the information and this had the effect of making identification of central themes difficult. Effectively this criticises holistic lectures for their lack of analytical content, something which is inevitable within this style of presentation.

Summary of Holistic Style.

The holistic lecture was interpreted by the student population as being a style of presentation which adopted a broad ranging, open format, which included using examples and metaphors from outside what could be called traditional academia. The benefits of this format were that the student felt that they were more able to readily identify with the format as it was already familiar to them.

Analytical Style.

The breaking down of the lectures into "clear cut points". Was one of the dominant themes generated by the student interviews about analytical lectures (See methodology appendix, categorisation C9). This reduction of information resulted in the students reporting these lectures as "straight forward" and "really clear", as there was no need on there part to select the appropriate information, "the facts and the theories were given to us".

Associated with this 'straight forward' interpretation of the content analytical lectures, students during the interviews also identified that the analytical lectures fit more closely in with a perceived 'traditional academic framework', even reporting them as "proper academic lectures" (See methodology appendix, categorisation C10).

The foundation for these perceptions was mainly that the lectures focused on "theoretical information." and that the information was appropriate for the standard academic exam, "The information was like what you put in an exam, a list of important things."

The negative image of the analytical lectures centred on the fact that the lectures became "a bit patronising." The reason for this was that the information was not problematised, it was too straight forward. This resulted in the information being "like an A-level", meaning that the information was not as open for debate or discussion. Rather it was perceived as being the definitive interpretation which had to be learnt by the student group (See methodology appendix, categorisation C11).

Summary of analytical style.

The analytical lecture was interpreted by the students as being more closely identified with a traditional approach to lecturing and implicit within this a traditional approach to education, with the criticism that the analytical lectures bordered on rote learning. However, it appears that the clear and precise format of the analytical style inspired confidence in the student which they enjoyed. The fact that it was also associated with a 'traditional' approach was not constantly perceived as negative, "I saw them as proper academic lectures".

Summary of experimental lecture styles of presentation.

The student have indicated that the two style of presentation (like the two styles of control) were perceived as distinct from each other. Neither one established a dominance in the favours of the students, they both were perceived as containing merits and limitations. The fact that the student rated the lectures as equally beneficial to their learning on the student lecture evaluation questionnaires can be interpreted as

the students recognising the appropriate benefits of a particular style and not that they were failing to distinguish between the styles of presentation.

Further information gained from the interviews.

Difficulty in answering interview questions.

When the students were being interview it became clear that they were having difficulty discussing the issues (See methodology appendix, section C12) . Partly this was due to the fact that they thought they had to identify which features were more effective, while being aware that all variables had their merits, "Like neither one has the answer they just have different good bit." It also became obvious from the interviews that some of the variables were new to the students (holistic/analytical) and as such they lacked the vocabulary to discuss them as effectively as they wished, "Oh god this isn't making any sense is it. It's really difficult." However, this does not mean that the students were totally unaware of the differences and any differences noted were a product of the interviews rather than spontaneously occurring true differences. It appeared that the students understood the differences at a more implicit level as is discussed below.

Implicit understanding.

A parallel them developed around the difficulty students had when discussing the experimental variables implicit understanding (See methodology appendix, category C13). The problem appeared to be that there was a difficulty actually articulating what the students knew or felt about the variables. "I couldn't and neither could they give a formal definition, something you could put in an essay but we all felt it referred to the same type of thing." The understanding the students had about the variables was 'active' in relation to the lectures, trying to express this formally was found to be very difficult. This expression of difficulty concerning the articulation of

the student opinions about the experimental variables, indicates that the students were not simply just saying the first thing that occurred to them, rather they were reflecting on the questions and trying to give a frank an answer as possible. Far from undermining the responses from the students I feel that this difficult highlight the seriousness with which the students approached the questions and the guardedness they exhibited against expressing purely what the interviewer wanted to here.

Adapt to the lecture.

The students reported a degree of flexibility within their approaches to the lectures (see methodology appendix, category C14), they clearly reported that they had to adapt if they were to learn from the various experimental lectures. Indicating that moving out of a 'learning style' to meet the requirements of a learning environment was perceived as the most effective course of action of the students. This flexibility is exhibited in the students interpretation of the experimental variables presented above, all the students were able to identify positive ways in which to view any particular lecture. Indicating that they were able to adapt their approach to learning in order to gain the most from any given lecturing style.

Skills of the tutor.

While students had effectively identified the manipulated variables within the study, they also recognised that the use of these variables required a skilled tutor in order that the styles or means of control worked efficiently (see methodology appendix, category C15), "You do that well, ... when anyone asked a question you tried to really answer it." It must also be recorded that some of the students felt that it was specifically the researcher who they thought was effective and they allowed him a certain amount of tolerance within the lectures, "I'm not sure anyone else could have got away with it, if it had been some of our other tutors I would have switched off. But I suppose I gave you the benefit." This indicates that the student may have been

more flexible in this experiment then they might be in other lecture environments. However, it does not remove the fact that students can be flexible in their approach and they are able to benefit from more than one lecturing environment.

Summary of information gained from the lectures.

The interviews have indicated that the students are able to distinguish between the experimental variables presented to them. The definitions given of each of the experimental variables is in line with the studies interpretation. Never was it the case that any one student was unable to perceive positive elements within any of the experimental variables. Negative points were forwarded but presented along side the positive elements.

A clear theme from the student responses was that the effective use of a particular style of presentation was as a result of sensitive implementation, that using analytical style would not make a lecture good, but if it was used to get across key concepts quickly it would be effective. No style of presentation or type of control was seen as a universal panacea, all experimental variables were criticised. All this information points away from the notion of matched learning and teaching styles, towards teaching style being matched to the material that is being delivered rather than the group which is receiving it.

Further analysis appendix.

Analysis of Forced choice ranking of lectures.

Analysis undertaken using first learning style groupings.

One -way analysis of variance on lecture one - Student controlled - Holistic

Source	DF	SS	MS	F	p
L.S.	4	2.104	0.526	0.79	0.556
Error	11	7.333	0.667		
Total	15	9.438			

Level	N	Mean	StDev
1	1	1.0000	0.0000
2	3	1.3333	0.5774
3	5	2.0000	0.7071
4	3	1.3333	0.5774
5	4	2.0000	1.1547

Pooled StDev = 0.8165

Individual 95% CIs For Mean Based on Pooled StDev

```
--------+---------+---------+--------
(-----------------*-----------------)
          (---------*----------)
                   (-------*-------)
          (---------*----------)
                   (--------*--------)
--------+---------+---------+--------
      0.0       1.0       2.0
```

One - way analysis of variance on lecture two Lecture controlled - Analytical.

Source	DF	SS	MS	F	p
L.S.	4	1.804	0.451	0.81	0.545
Error	11	6.133	0.558		
Total	15	7.938			

Level	N	Mean	StDev
1	1	3.0000	0.0000
2	3	3.6667	0.5774
3	5	3.8000	0.4472
4	3	3.3333	0.5774
5	4	3.0000	1.1547

Pooled StDev = 0.7467

Individual 95% CIs For Mean Based on Pooled StDev

```
-------+---------+---------+---------
 (---------------*---------------)
              (---------*---------)
                  (------*------)
           (--------*---------)
        (-------*-------)
-------+---------+---------+---------
     2.0       3.0       4.0
```

One-Way Analysis of Variance for lecture three Student controlled -Analytical.

Source	DF	SS	MS	F	p
L.S.	4	2.554	0.639	1.02	0.439
Error	11	6.883	0.626		
Total	15	9.438			

Level	N	Mean	StDev
1	1	2.0000	0.0000
2	3	1.6667	0.5774
3	5	1.2000	0.4472
4	3	1.6667	0.5774
5	4	2.2500	1.2583

Pooled StDev = 0.7910

Individual 95% CIs For Mean Based on Pooled StDev

```
--------+---------+---------+--------
 (----------------*----------------)
     (---------*---------)
   (-------*-------)
     (---------*---------)
              (-------*--------)
--------+---------+---------+--------
      1.0       2.0       3.0
```

One-Way Analysis of Variance of lecture four Lecturer controlled - Holistic.

Source	DF	SS	MS	F	p
L.S.	4	2.354	0.589	0.80	0.549
Error	11	8.083	0.735		
Total	15	10.438			

Individual 95% CIs For Mean Based on Pooled StDev

Level	N	Mean	StDev	-----+---------+---------+---------+-
1	1	4.0000	0.0000	(--------------*--------------)
2	3	3.3333	0.5774	(--------*--------)
3	5	3.0000	0.7071	(------*------)
4	3	3.6667	0.5774	(---------*--------)
5	4	2.7500	1.2583	(-------*-------)
				-----+---------+---------+---------+-
Pooled StDev =		0.8572		2.4 3.6 4.8 6.0

Using Second Learning style groupings.

One-Way Analysis of Variance of lecture one Student controlled - Holistic.

Source	DF	SS	MS	F	p
L.S.2	3	4.044	1.348	3.00	0.073
Error	12	5.394	0.449		
Total	15	9.438			

Individual 95% CIs For Mean
Based on Pooled StDev

Level	N	Mean	StDev	----+---------+---------+---------+--
1	1	3.0000	0.0000	(---------*---------)
3	3	2.3333	0.5774	(-----*----)
4	1	1.0000	0.0000	(---------*--------)
5	11	1.4545	0.6876	(--*--)
				----+---------+---------+---------+--
Pooled StDev =		0.6704		0.0 1.5 3.0 4.5

critical value = 5.42 P<= 0.05

One-Way Analysis of Variance of lecture two Lecturer controlled - Analytical.

Source	DF	SS	MS	F	p
L.S.2	3	2.544	0.848	1.89	0.186
Error	12	5.394	0.449		
Total	15	7.938			

Individual 95% CIs For Mean
Based on Pooled StDev

Level	N	Mean	StDev	-------+---------+---------+---------
1	1	2.0000	0.0000	(--------*---------)
3	3	3.6667	0.5774	(----*-----)
4	1	4.0000	0.0000	(---------*--------)
5	11	3.4545	0.6876	(--*--)
				-------+---------+---------+---------
Pooled StDev =		0.6704		1.5 3.0 4.5

One-Way Analysis of Variance of lecture three Student controlled - Analytical.

Source	DF	SS	MS	F	p
L.S.2	3	2.528	0.843	1.46	0.274
Error	12	6.909	0.576		
Total	15	9.438			

Individual 95% CIs For Mean
Based on Pooled StDev

Level	N	Mean	StDev	------+---------+---------+---------+
1	1	1.0000	0.0000	(------------*------------)
3	3	1.0000	0.0000	(-------*-------)
4	1	2.0000	0.0000	(------------*------------)
5	11	1.9091	0.8312	(---*---)
				------+---------+---------+---------+
Pooled StDev =		0.7588		0.0 1.2 2.4 3.6

One-Way Analysis of Variance for lecture four Lecturer controlled - Holistic.

Source	DF	SS	MS	F	p
L.S.2	3	0.801	0.267	0.33	0.802
Error	12	9.636	0.803		
Total	15	10.438			

Level	N	Mean	StDev	Individual 95% CIs For Mean Based on Pooled StDev
1	1	4.0000	0.0000	(----------*----------)
3	3	3.0000	1.0000	(-------*-------)
4	1	3.0000	0.0000	(----------*----------)
5	11	3.1818	0.8739	(---*---)

Pooled StDev = 0.8961

1.5 3.0 4.5 6.0

'Rotter' Descriptive Statistics

Variable	N	Mean	Median	TrMean	StDev	SEMean
Rotter	16	13.250	13.500	13.143	3.751	0.938

Variable	Min	Max	Q1	Q3
Rotter	8.000	20.000	9.250	16.000

Summary Statistics for Rotter locus of control scores.

Rotter	Count	Percent
8	2	12.50
9	2	12.50
10	1	6.25
11	1	6.25
13	2	12.50
14	1	6.25
15	2	12.50
16	2	12.50
17	1	6.25
18	1	6.25
20	1	6.25
N=	16	

High and low locus of control scores rantings of lectures.

N.B. group 1 - Internal control
group 2 - External control

One-Way Analysis of Variance for control rating of lecturer controlled - analytical lectures.

Source	DF	SS	MS	F	p
RotterC	1	1.21	1.21	0.63	0.448
Error	9	17.33	1.93		
Total	10	18.55			

Level	N	Mean	StDev	Individual 95% CIs For Mean Based on Pooled StDev
1	6	3.333	1.366	(-----------*-----------)
2	5	4.000	1.414	(-------------*-------------)

Pooled StDev = 1.388

3.0 4.0 5.0

One-Way Analysis of Variance for effect of control rating of lecturer controlled - analytical lectures.

Source	DF	SS	MS	F	p
RotterC	1	0.048	0.048	0.07	0.796
Error	9	6.133	0.681		
Total	10	6.182			

Level	N	Mean	StDev	Individual 95% CIs For Mean Based on Pooled StDev
1	6	1.6667	0.8165	(----------*----------)
2	5	1.8000	0.8367	(----------*----------)

Pooled StDev = 0.8255

1.00 1.50 2.00 2.50

One-Way Analysis of Variance for style rating of lecturer controlled - analytical lectures.

Source	DF	SS	MS	F	p
RotterC	1	0.19	0.19	0.06	0.816
Error	9	30.53	3.39		
Total	10	30.73			

Level	N	Mean	StDev	Individual 95% CIs For Mean Based on Pooled StDev
1	6	4.667	2.251	(----------*----------)
2	5	4.400	1.140	(----------*----------)

Pooled StDev = 1.842

3.6 4.8 6.0

One-Way Analysis of Variance for effect of style rating of lecturer controlled - analytical lectures.

Source	DF	SS	MS	F	p
RotterC	1	0.303	0.303	0.51	0.493
Error	9	5.333	0.593		
Total	10	5.636			

Level	N	Mean	StDev	Individual 95% CIs For Mean Based on Pooled StDev
1	6	1.6667	0.8165	(----------*----------)
2	5	2.0000	0.7071	(----------*----------)

Pooled StDev = 0.7698

1.00 1.50 2.00 2.50

One-Way Analysis of Variance for general feeling rating of lecturer controlled - analytical lectures.

Source	DF	SS	MS	F	p
RotterC	1	0.027	0.027	0.09	0.770
Error	9	2.700	0.300		
Total	10	2.727			

Level	N	Mean	StDev	Individual 95% CIs For Mean Based on Pooled StDev
1	6	1.5000	0.5477	(----------*----------)
2	5	1.4000	0.5477	(----------*----------)

Pooled StDev = 0.5477

1.05 1.40 1.75 2.10

One-Way Analysis of Variance for control rating of student controlled - holistic lectures.

Source	DF	SS	MS	F	p
RotterC	1	16.40	16.40	6.69	0.027
Error	10	24.51	2.45		
Total	11	40.92			

Level	N	Mean	StDev	Individual 95% CIs For Mean Based on Pooled StDev
1	5	6.800	1.095	(---------*---------)
2	7	4.429	1.813	(--------*-------)

Pooled StDev = 1.566

4.5 6.0 7.5

One-Way Analysis of Variance for effect of control rating of student controlled - holistic lectures.

Source	DF	SS	MS	F	p
RotterC	1	0.860	0.860	1.07	0.326
Error	10	8.057	0.806		
Total	11	8.917			

Level	N	Mean	StDev	Individual 95% CIs For Mean Based on Pooled StDev
1	5	2.4000	0.5477	(----------*----------)
2	7	1.8571	1.0690	(----------*----------)

Pooled StDev = 0.8976

1.20 1.80 2.40 3.00

One-Way Analysis of Variance for style rating of student controlled - holistic lectures.

Source	DF	SS	MS	F	p
RotterC	1	1.87	1.87	0.34	0.572
Error	10	54.80	5.48		
Total	11	56.67			

Level	N	Mean	StDev	Individual 95% CIs For Mean Based on Pooled StDev
1	5	4.800	2.588	(---------*---------)
2	7	4.000	2.160	(---------*---------)
Pooled StDev =		2.341		3.0 4.5 6.0

One-Way Analysis of Variance for effect of style rating of student controlled - holistic lectures.

Source	DF	SS	MS	F	p
RotterC	1	2.288	2.288	4.94	0.050
Error	10	4.629	0.463		
Total	11	6.917			

Level	N	Mean	StDev	Individual 95% CIs For Mean Based on Pooled StDev
1	5	2.6000	0.8944	(---------*---------)
2	7	1.7143	0.4880	(---------*---------)
Pooled StDev =		0.6803		1.20 1.80 2.40 3.00

One-Way Analysis of Variance for general feelings rating of student controlled - holistic lectures.

Source	DF	SS	MS	F	p
RotterC	1	1.152	1.152	1.77	0.213
Error	10	6.514	0.651		
Total	11	7.667			

Level	N	Mean	StDev	Individual 95% CIs For Mean Based on Pooled StDev
1	5	2.2000	1.0954	(---------*---------)
2	7	1.5714	0.5345	(---------*---------)
Pooled StDev =		0.8071		1.20 1.80 2.40 3.00

One-Way Analysis of Variance for control rating of student controlled - analytical lectures.

Source	DF	SS	MS	F	p
RotterC	1	2.01	2.01	1.47	0.265
Error	7	9.55	1.36		
Total	8	11.56			

Level	N	Mean	StDev	Individual 95% CIs For Mean Based on Pooled StDev
1	4	3.250	1.500	(---------*---------)
2	5	4.200	0.837	(---------*---------)
Pooled StDev =		1.168		2.0 3.0 4.0 5.0

One-Way Analysis of Variance for effect of control rating of student controlled - analytical lectures.

Source	DF	SS	MS	F	p
RotterC	1	0.94	0.94	0.66	0.443
Error	7	9.95	1.42		
Total	8	10.89			

Level	N	Mean	StDev	Individual 95% CIs For Mean Based on Pooled StDev
1	4	1.750	0.500	(----------*----------)
2	5	2.400	1.517	(----------*----------)

Pooled StDev = 1.192

1.0 2.0 3.0

One-Way Analysis of Variance for style rating of student controlled - analytical lectures.

Source	DF	SS	MS	F	p
RotterC	1	0.09	0.09	0.01	0.913
Error	7	48.80	6.97		
Total	8	48.89			

Level	N	Mean	StDev	Individual 95% CIs For Mean Based on Pooled StDev
1	4	4.000	3.367	(----------*----------)
2	5	4.200	1.924	(----------*----------)

Pooled StDev = 2.640

2.0 4.0 6.0 8.0

One-Way Analysis of Variance for effect of style rating of student controlled - analytical lectures.

Source	DF	SS	MS	F	p
RotterC	1	0.939	0.939	3.37	0.109
Error	7	1.950	0.279		
Total	8	2.889			

Level	N	Mean	StDev	Individual 95% CIs For Mean Based on Pooled StDev
1	4	2.2500	0.5000	(----------*----------)
2	5	1.6000	0.5477	(----------*----------)

Pooled StDev = 0.5278

1.50 2.00 2.50

One-Way Analysis of Variance for general feelings rating of student controlled - analytical lectures.

Source	DF	SS	MS	F	p
RotterC	1	0.408	0.408	1.67	0.244
Error	6	1.467	0.244		
Total	7	1.875			

Level	N	Mean	StDev	Individual 95% CIs For Mean Based on Pooled StDev
1	3	1.6667	0.5774	(----------*----------)
2	5	1.2000	0.4472	(----------*----------)

Pooled StDev = 0.4944

1.00 1.50 2.00

One-Way Analysis of Variance for control rating of lecturer controlled - holistic lectures.

Source	DF	SS	MS	F	p
RotterC	1	4.17	4.17	0.97	0.347
Error	10	42.75	4.28		
Total	11	46.92			

Level	N	Mean	StDev	Individual 95% CIs For Mean Based on Pooled StDev
1	4	2.750	2.217	(----------*----------)
2	8	4.000	2.000	(----------*----------)
Pooled StDev =		2.068		1.5 3.0 4.5

One-Way Analysis of Variance for effect of control rating of lecturer controlled - holistic lectures.

Source	DF	SS	MS	F	p
RotterC	1	0.375	0.375	0.48	0.506
Error	10	7.875	0.788		
Total	11	8.250			

Level	N	Mean	StDev	Individual 95% CIs For Mean Based on Pooled StDev
1	4	2.5000	1.0000	(----------*----------)
2	8	2.1250	0.8345	(----------*----------)
Pooled StDev =		0.8874		1.80 2.40 3.00

One-Way Analysis of Variance for style rating of lecturer controlled - holistic lectures.

Source	DF	SS	MS	F	p
RotterC	1	0.38	0.38	0.08	0.785
Error	10	47.88	4.79		
Total	11	48.25			

Level	N	Mean	StDev	Individual 95% CIs For Mean Based on Pooled StDev
1	4	5.500	3.000	(----------*----------)
2	8	5.875	1.727	(----------*----------)
Pooled StDev =		2.188		4.5 6.0 7.5

One-Way Analysis of Variance for effect of style rating of lecturer controlled - holistic lectures.

Source	DF	SS	MS	F	p
RotterC	1	0.938	0.938	1.51	0.251
Error	9	5.607	0.623		
Total	10	6.545			

Level	N	Mean	StDev	Individual 95% CIs For Mean Based on Pooled StDev
1	4	2.7500	0.9574	(----------*----------)
2	7	2.1429	0.6901	(----------*----------)
Pooled StDev =		0.7893		1.80 2.40 3.00 3.60

One-Way Analysis of Variance for general feeling rating of lecturer controlled - holistic lectures.

Source	DF	SS	MS	F	p
RotterC	1	1.500	1.500	3.33	0.098
Error	10	4.500	0.450		
Total	11	6.000			

Level	N	Mean	StDev
1	4	2.5000	1.0000
2	8	1.7500	0.4629

Pooled StDev = 0.6708

Individual 95% CIs For Mean Based on Pooled StDev